

In the United States Court of Federal Claims

No. 04-99C
(Filed November 30, 2010)

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**KANSAS GAS & ELECTRIC CO.,
KANSAS CITY POWER & LIGHT
CO., AND KANSAS ELECTRIC
POWER COOPERATIVE, INC.,**

* Contracts; breach of contract;
* spent nuclear fuel; claim for
* damages in mitigation of the
* breach and damages for
* overhead allocable to capital
* improvements necessitated by
* the breach.

Plaintiffs,

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v.

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THE UNITED STATES,

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Defendant.

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Robert L. Shapiro, with whom was Jason C. Benton, Daniel T. Lloyd, and Madeleine C. Selwyn, Hughes Hubbard & Reed LLP, Washington DC, for plaintiffs.

Christopher J. Carney, Washington, DC, with whom was Assistant Attorney General Tony West, for defendant. Jane K. Taylor, Office of General Counsel, U.S. Department of Energy, and Mason C. Alinger, James P. Connor, Jeremiah Luongo, and Luke A. E. Pazicky, U.S. Department of Justice, Washington, DC, of counsel.

MEMORANDUM OPINION AND ORDER

MILLER, Judge.

This spent nuclear fuel (“SNF”) case is before the court after trial and post-trial briefing. Plaintiffs, three utility companies, are joint owners of the Wolf Creek Nuclear Operating Corporation, which operates the Wolf Creek Generating Station (“Wolf Creek”), a single-unit nuclear reactor located in Coffey County, Kansas. Transcript of Proceedings at 902, Kansas Gas & Electric Co., et al. v. United States, No. 04-99C (Fed. Cl. June 7-17, 2010) (“Tr.”) (testimony of Richard A. Muench, former President and Chief Executive

Officer of Wolf Creek); 1/ Factual Stipulations filed May 28, 2010, ¶ 1. Plaintiffs allege \$14,148,967.10 in damages on account of mitigation measures taken in response to a partial breach by the Department of Energy (“DOE”) of the June 14, 1983 Standard Contract for Disposal of Spent Nuclear Fuel and/or High Level Radioactive Waste (the “Standard Contract”), which obligated DOE to collect the spent nuclear fuel of nuclear utilities, including Wolf Creek. Plaintiffs’ damages derive from their investigation of alternative SNF storage options and their implementation of a reracking project at Wolf Creek. The majority of the \$14,148,967.10, or \$13,681,990.10, is to be allocated to the three constituent plaintiffs according to each plaintiff’s respective ownership interest in Wolf Creek. 2/ The remainder, or \$466,977.00, plaintiffs allege to be additional “Allowance for Funds Used During Construction” (“AFUDC costs”), damages claimed only by plaintiffs Kansas Gas & Electric Company and Kansas City Power & Light Company. 3/

FACTS 4/

The court possesses jurisdiction to hear plaintiffs’ claim pursuant to the Tucker Act, 28 U.S.C. § 1491(a) (2006). See PSEG Nuclear, L.L.C. v. United States, 465 F.3d 1343, 1349-50 (Fed. Cir. 2006). The general factual and statutory backgrounds of the Standard Contract and circumstances underlying this and other spent nuclear fuel claims before the United States Court of Federal Claims have been explained thoroughly in opinions issued by the United States Court of Appeals for the Federal Circuit and by other judges of the court. E.g., Neb. Pub. Power Dist. v. United States, 590 F.3d 1357 (Fed. Cir. 2010); Yankee Atomic Elec. Co. v. United States, 536 F.3d 1268 (Fed. Cir. 2008) (“Yankee II”); Pac. Gas & Elec. Co. v. United States, 536 F.3d 1282 (Fed. Cir. 2008); Me. Yankee Atomic Power Co. v. United States, 225 F.3d 1336 (Fed. Cir. 2000); Yankee Atomic Elec. Co. v. United States,

1/ Parentheses attribute statements by counsel and witnesses. Statements by counsel do not constitute testimony or evidence, although they proved useful for setting forth litigating positions and for explaining uncontested terms.

2/ Of the \$13,681,990.10, both Kansas Gas & Electric Company and Kansas City Power & Light Company have a forty-seven-percent interest based on ownership and claim damages of \$6,635,828.35 and \$6,692,219.35, respectively. Kansas Electric Power Cooperative, Inc., with a six-percent ownership interest, claims \$820,919.40 in damages.

3/ Of the \$466,977.00, Kansas Gas & Electric Company claims \$205,293.00, and Kansas City Power & Light Company claims \$261,684.00.

4/ The facts set forth in the “Facts” and “Discussion” sections of this opinion constitute the court’s findings of fact pursuant to RCFC 52(a)(1), (c). Rulings on mixed questions of fact and law are set forth in the “Discussion” section.

73 Fed. Cl. 249 (2006), aff'd in part, rev'd in part, 536 F.3d 1268 (Fed. Cir. 2008) ("Yankee I"). Accordingly, this opinion only discusses those facts necessary to resolve the issues raised at trial. See Yankee II, 536 F.3d at 1271.

I. Statutory and general factual background

1. The Nuclear Waste Policy Act of 1982

In enacting the Nuclear Waste Policy Act of 1982, Pub. L. No. 97-425, 96 Stat. 2201 (codified at 42 U.S.C. §§ 10101-10270 (2006)) (the "NWPA"), Congress sought to address a "national problem [that] has been created by the accumulation of (A) spent nuclear fuel from nuclear reactors; and (B) radioactive waste from . . . reprocessing of spent nuclear fuel[,]" 42 U.S.C. § 10131(a)(2). In order to "protect the public health and safety and the environment, id. § 10131(a)(4), the NWPA authorized DOE to contract with nuclear utilities to collect their SNF and high-level radioactive waste ("HLW"), see id. § 10222(a)(1). The NWPA made entry into such contracts with DOE mandatory for nuclear utilities. See Me. Yankee, 225 F.3d at 1337 (citing 42 U.S.C. § 10222(b)(1)(A)). The NWPA further required "that all such contracts 'shall provide that' the [DOE] will dispose of the waste 'beginning not later than January 31, 1998.'" Id. (citing 42 U.S.C. § 10222(a)(5)(B)).

2. The Standard Contract

DOE responded in 1983 by promulgating the proposed Standard Contract for public comment and feedback. See PX 4 (Standard Contract for Disposal of Spent Nuclear Fuel and/or High Level Radioactive Waste, 48 Fed. Reg. 5458, 5461-71 (Feb. 4, 1983) (codified at 10 C.F.R. pt. 961.11 (1984))); ^{5/} see also Pac. Gas & Elec., 536 F.3d at 1285. "In general, the contract required companies with SNF to pay a fee that the DOE would use to develop an SNF storage facility and to collect and maintain SNF at the facility." PSEG Nuclear, 465 F.3d at 1344. The storage facility was to be located at Yucca Mountain, Nevada. See id. at 1344 n.1. The utilities that entered into the Standard Contract with DOE agreed to pay substantial fees in consideration of the Government's performance. These fees included "both a one-time fee based on past nuclear generation of electricity and on-going [quarterly] fees." Delmarva Power & Light Co. v. United States, 542 F.3d 889, 891 (Fed. Cir. 2008); see also Carolina Power & Light Co. v. United States, 573 F.3d 1271, 1273 (Fed. Cir. 2009) ("Carolina Power II"). Plaintiffs entered into the Standard Contract with DOE on October 10, 1984. Factual Stipulations ¶ 12; JX 1 (Contract for Disposal of Spent Nuclear Fuel and/or High Level Radioactive Waste by and between plaintiffs and DOE).

^{5/} The final version of the Standard Contract was promulgated in April 1983. See PX 28 (Standard Contract for Disposal of Spent Nuclear Fuel and/or High Level Radioactive Waste, 48 Fed. Reg. 16,590, 16,599-608 (codified at 10 C.F.R. pt. 961.11 (1984))).

3. DOE's breach of the Standard Contract

Pursuant to the schedule mandated by the NWPA, the Standard Contract obligated DOE to take title to and dispose of the SNF by January 31, 1998. Carolina Power II, 573 F.3d at 1273; Me. Yankee, 225 F.3d at 1338. The first scheduled collection of Wolf Creek's surplus SNF would have been in 2006. See Factual Stipulations ¶ 15. DOE failed to remove any SNF from any of the nuclear utilities, including Wolf Creek, by January 31, 1998; it has not removed any SNF to date. See Yankee II, 536 F.3d at 1271-72. As of December 31, 2008, Wolf Creek had paid all required fees under the Standard Contract. Factual Stipulations ¶14. The parties do not dispute that DOE's failure to perform constituted a partial breach of the contract. See id. ¶ 18 ("The [G]overnment did not pick up SNF from any commercial nuclear utility pursuant to the Standard Contract."); see also Carolina Power II, 573 F.3d at 1273; Yankee II, 536 F.3d at 1272; Me. Yankee, 225 F.3d at 1343. Rather, the parties dispute the amount of mitigation damages recoverable by plaintiffs for that breach.

Whether Yucca Mountain will ever become a permanent repository for SNF is an elusive proposition. See S. Cal. Edison Co. v. United States, 93 Fed. Cl. 337, 341-42 (2010), appeal docketed, No. 2010-5147 (Fed. Cir. Aug. 20, 2010). The Obama Administration has made public its intention not to move forward with storing SNF at Yucca Mountain. See Lisa Mascara, Obama to zero out Yucca Mountain funding, pull license, Las Vegas Sun, Jan. 31, 2010 ("The president's intention to pull the license application—a promise he made while campaigning in Nevada—would be one of the most critical moves yet in stopping the proposed nuclear waste dump in Nevada."); Steve Vogel, Controversy Over Yucca Mountain May Be Ending, Wash. Post, March 4, 2009, at A13 ("In keeping with a pledge President Obama made during the campaign, the budget released last week cuts off almost all funding for creating a permanent burial site for a large portion of the nation's radioactive nuclear waste at [Yucca Mountain] in the Nevada desert."). On March 3, 2010, DOE filed a motion with the United States Nuclear Regulatory Commission (the "NRC") seeking to withdraw with prejudice its application for a license to operate the Yucca Mountain repository. See U.S. Dep't of Energy (High Level Waste Repository), CLI-10-13, 71 N.R.C. ___, 2010 NRC LEXIS 15, at *1 (Apr. 23, 2010). 6/ "DOE requested that its application be dismissed with

6/ Several states and utilities have also intervened in the action, suing to preserve the use of Yucca Mountain as a repository. See Edison, 93 Fed. Cl. at 341-42; U.S. Dep't of Energy, CLI-10-13, 2010 NRC LEXIS at *1 n.2; U.S. Dep't of Energy (High Level Waste Repository), ASLBP No. 09-892-HLW-CAB04, ___ N.R.C. ___, slip op. at 2 n.5 (June 29, 2010). Several nuclear utilities have brought suit in the United States Court of Appeals for the District of Columbia Circuit "seeking to halt the collection of fees mandated by the Standard Contract for the construction and operation of the now defunct Yucca Mountain repository." Edison, 93 Fed. Cl. at 342 (citing Joint Petition for Review, Nuclear Energy

prejudice “because it does not intend ever to re-file an application to construct a permanent geologic repository for [SNF] and [HLW] at Yucca Mountain.”” Edison, 93 Fed. Cl. at 341 (citation omitted). On June 29, 2010, the Atomic Safety and Licensing Board (the “ASLB”) denied DOE’s motion to withdraw, holding that the “NWPA does not give the Secretary [of DOE] the discretion to substitute his policy for the one established by Congress in the NWPA that, at this point, mandates progress toward a merits decision by the [NRC] on the construction permit.” U.S. Dep’t of Energy (High Level Waste Repository), ASLBP No. 09-892-HLW-CAB04, ____ N.R.C. ___, slip op. at 3 (June 29, 2010). DOE is appealing this decision to the full Commission, although Judge Baskir aptly observed in Edison: “[A]s a practical matter the Yucca Mountain proposal is dead, there are currently no alternate plans for a repository, and the government cannot perform under the Standard Contract.” 93 Fed. Cl. at 342.

4. Planned Acceptance Rates

The Standard Contract did not provide specific rates or schedules for collecting spent fuel. See PX 4 (Standard Contract for Disposal of Spent Nuclear Fuel and/or High Level Radioactive Waste, 48 Fed. Reg. at 5461-71); JX 1 (Contract for Disposal of Spent Nuclear Fuel and/or High Level Radioactive Waste by and between plaintiffs and DOE); Carolina Power II, 573 F.3d at 1273; Pac. Gas & Elec., 536 F.3d at 1285. Instead, DOE was required to issue annual capacity reports (“ACRs”) by July 1, 1987, “setting forth projected yearly receiving capacity for government nuclear waste storage facilities.” Carolina Power II, 573 F.3d at 1273; see also PX 4. The ACRs forecast annual receiving capacities and annual acceptance rankings for DOE nuclear waste storage facilities. Pac. Gas & Elec., 536 F.3d at 1285-86. As described by Matthew K. Morris, KGE’s nuclear engineer responsible for administering the Standard Contract at Wolf Creek, “[t]he RW-859 [report] is the reporting method that was used to provide the [DOE] with our actual discharges and our projected discharges so that they could do their planning for producing the acceptance priority ranking and the . . . Annual Capacity Report[s].” Tr. at 65-66 (Morris). “[T]he Standard Contract also required DOE to issue annual acceptance priority rankings [(“APRs”)]. Pac. Gas & Elec., 536 F.3d at 1286. The APRs were to begin on April 1, 1991, id., and were to “identify the order in which SNF and [high level waste] would be collected from various parties, based on a first-in, first-out queue model.” Carolina Power II, 573 F.3d at 1273. The parties have stipulated that the court is bound to use the acceptance rate in the 1987 ACR. See Joint

6/ (Cont’d from page 4.)

Inst. v. U.S. Dep’t of Energy, No. 10-1076 (D.C. Cir. Apr. 5, 2010); Petition for Review, Nat’l Ass’n of Regulatory Util. Comm’rs v. United States, No. 10-1074 (D.C. Cir. Apr. 2, 2010)).

Stipulations on Legal Issues Related to Damages, filed May 28, 2010, ¶ 6 (“Damages Stipulations”).

The Standard Contract allocated collections according to oldest fuel first (“OFF”), i.e., according to the chronological order of past discharges. JX 1 at 9749-50 (“[A]cceptance priority shall be based upon the age of the SNF and/or HLW as calculated from the date of discharge of such material from the civilian nuclear power reactor.”). Lake H. Barrett, former Deputy Director of DOE’s Office of Civilian Radioactive Waste Management (“OCRWM”), explained: “[T]he concept was that the utilities have the allocation based on oldest fuel first, which is the oldest fuel that they discharged from their reactor. . . . And the DOE would . . . pick up the fuel and work with the utilities on those rights.” Tr. at 1046; see Pac. Gas & Elec., 536 F.3d at 1285 (“The Standard Contract also included provisions setting priority for acceptance of waste (generally through an oldest fuel first (OFF) scheme) and allowed utilities to approve delivery commitment schedules (the Exchanges provision.”). The Standard Contract provided further that the utilities were to respond to the APRs by submitting a delivery commitment schedule (“DCS”) to DOE that identified the SNF ready for delivery to DOE commencing sixty-three months after the DCS submission. Pac. Gas & Elec., 536 F.3d at 1286. This process is referred to as the acceptance capacity schedule (“ACS”) process. Id. Applying the 1987 ACR rates, without taking into account any impact on the acceptance queue of Greater Than Class C radioactive waste, DOE would have made its first collection of SNF from Wolf Creek in 2006. Factual Stipulations ¶ 15. DOE’s first pick-up would include approximately 27.7 metric tons of uranium, or the equivalent of sixty spent fuel assemblies. Id. ¶ 16.

II. Wolf Creek Generating Station

1. Background on Wolf Creek

Plaintiffs are Kansas Gas and Electric Company (“KGE”), a Kansas-based utility and subsidiary of Westar Energy, Inc.; Kansas City Power & Light Company (“KCPL”), a Missouri-based utility and subsidiary of Great Plains Energy Inc.; and Kansas Electric Power Cooperative, Inc. (“KEPCO”), a wholesale electric cooperative. Together plaintiffs are the joint owners of Wolf Creek, a single-unit nuclear reactor located in Coffey County, near Burlington, Kansas. Id. ¶ 1. Plaintiffs are also owners of Wolf Creek Nuclear Operating Corporation (“WCNOC”), which operates Wolf Creek as the owners’ agent. Id. ¶ 2. Wolf Creek began operations on September 3, 1985. Id. ¶ 4. The NRC granted Wolf Creek an initial license to operate for forty years, until March 2025. Id. ¶ 5. In November 2008 the NRC granted Wolf Creek’s license renewal application, extending its license until March 11, 2045. Id. ¶ 5.

The electricity generated by Wolf Creek is the result of nuclear fuel, i.e., enriched uranium contained in fuel assemblies.^{7/} As the plant generates electricity, the nuclear fuel must be replaced with fresh nuclear fuel. See Pac. Gas & Elec. Co. v. State Energy Res. Conservation & Dev. Comm'n, 461 U.S. 190, 195 (1983) ("A nuclear reactor must be periodically refueled and the 'spent fuel' removed."). The removed or "spent" fuel is commonly referred to as spent nuclear fuel. Factual Stipulations ¶¶ 6-8. Mr. Morris explained how an electric nuclear plant works:

Basically you take enriched uranium and you form it into what we call a fuel pellet. The fuel pellets are then loaded into a tube, which is then sealed at both ends to create what we call the fuel rod.

The fuel rods are loaded into a support structure to form the fuel assembly. The fuel assemblies are then loaded into the reactor vessel, what we call the core. And when you load enough of the assemblies into the core, you achieve a critical mass that would allow you to sustain a reaction of the atom splitting.

The atom splitting releases a lot of heat. The water flowing through the core absorbs that heat. That heat is then transferred to a secondary system . . . through the steam generators, which then allows the steam to be created. The steam flows through the turbine to drive the turbine, and the turbine then drives the electrical generator, producing the electricity.

Tr. at 66-67.

2. Wolf Creek's spent nuclear fuel storage

Wolf Creek's nuclear reactor operates with 193 fuel assemblies. See Tr. at 68 (Morris).^{8/} When removed from the reactor core, the spent fuel is placed into "wet" storage

^{7/} "Enrichment" is a measure of the amount of uranium in the nuclear fuel. See Tr. at 142 (Morris).

^{8/} A fuel assembly is "approximately [nine] inches square and approximately [thirteen] feet tall." Tr. at 68. Mr. Morris elaborated further:

The assembly contains all the fuel rods. It has grids, the support structure which I discussed before. It's referred to as a skeleton. There's a top nozzle and a bottom nozzle. There are guide thimbles inside the assembly

spaces in racks located in Wolf Creek's spent fuel pool. A single storage space in the spent fuel pool accommodates one assembly. Tr. at 462 (Dr. Dean M. Murphy, plaintiffs' expert in energy economics and modeling competitive markets in energy services). 9/ Prior to 2000 Wolf Creek's old storage racks were licensed to store 1,340 spent fuel assemblies, Factual Stipulations ¶ 11; PX 104 at 7069 ("The original design for [Wolf Creek] provided storage for 1,340 spent fuel assemblies."); Tr. at 86 (Morris) ("The total installed capacity was . . . 1,340."), but the racks "had an actual maximum [storage] capacity of 1,327 assemblies" because thirteen cells were defective, Tr. at 86; see also Tr. at 98 (Morris); PX 116 at 2122 (1995 spent fuel storage report showing 1,340 to be Wolf Creek's licensed capacity, but 1,327 to be its maximum capacity).

To maintain adequate spacing between the assemblies consistent with considerations of criticality, 10/ the assemblies were divided into two groups of configurations ("Region 1" and "Region 2"). The assemblies were split between 1,128 in a Region 2 configuration and 199 in a permanent Region 1 configuration. Factual Stipulations ¶ 11. A region is a group of assemblies that are delivered at the same time, and are "burned" over two or three cycles. Tr. at 68-69 (Morris) ("By burn, I mean . . . how many . . . operating cycles between the refuelings."). Whether Region 1 or Region 2, each rack had groups of four storage cells. However, because Wolf Creek used empty cells to control criticality, it did not store SNF in all four cells of a storage rack. See Tr. at 84-85 (Morris); see also Tr. at 143 (Morris) ("[Regulating criticality] was part of their purpose. Another purpose was heat."). Wolf Creek sealed the empty cells with a cap. Tr. at 143. A Region 2 configuration used three out of four cells, leaving one cell empty. Tr. at 155 (Morris). A Region 1 configuration used two out of the four cells. Tr. at 154-55. Wolf Creek's reactor engineering department

8/ (Cont'd from page 7.)

which allows you to insert other core components, such as the control rods or burnable poison or thimble plug, various different core components.

Tr. at 68.

9/ Witnesses interchangeably used the terms "assemblies" and "spaces" when discussing Wolf Creek's storage capacity.

10/ "Criticality" refers to the potential for a self-sustaining nuclear reaction. Tr. at 45 (defendant's lead counsel Christopher J. Carney); see also Tr. at 84 (Morris) ("[W]hen the reactor is operating, that's when you have criticality."). Empty cells were a prophylactic measure to prevent the SNF from achieving criticality. See Tr. at 84-85 (Morris) ("[I]n the reactor [criticality is] good, and in the spent fuel pool it's not because you don't have the same kinds of shielding.").

calculated the initial number of Region 1 and Region 2 assemblies by evaluating initial enrichment levels, burnup projections, 11/ and the physical limitations of the cells. Tr. at 141 (Morris). If an assembly “achieve[d] the burnup required for the enrichment of that assembly,” it could be stored in a Region 2 configuration. Tr. at 154 (Morris). Assemblies demonstrating less burnup required a Region 1 configuration. Tr. at 141 (Morris). Region 2 could be altered to provide for storage of fuel assemblies requiring the two-out-of-four configuration. Factual Stipulations ¶ 11. To the extent Region 2 spaces are converted to Region 1 spaces, the pool’s capacity correspondingly decreases below 1,327 spaces. Id.

Wolf Creek’s first three refuelings occurred annually; beginning in 1989, the plant transitioned to eighteen-month-long operating cycles between refuelings. Tr. at 69 (Morris). The plant continues to operate with eighteen-month-long cycles. When Wolf Creek ran annual cycles, it typically discharged fifty-two assemblies at one time. After transitioning to the eighteen-month-long cycles, the discharge rate increased to approximately eighty, at times increasing to eighty-eight discharged assemblies. Tr. at 69 (Morris) (“And then during cycle 7, we uprated the plant. By uprate, what we did is we increased the heat output of the reactor. As a result of that, we needed to load a few more assemblies in addition. So the . . . discharge rate went to approximately 88 at that time.”). The discharged assemblies are transported from the reactor core to the fuel building, which contains Wolf Creek’s spent fuel pool. Tr. at 70 (Morris). Spent fuel storage racks are built into the pool, and the discharged assemblies are placed in the racks for storage. Tr. at 70.

Wolf Creek maintains full-core reserve capacity in its spent fuel pools to discharge all of the assemblies in the reactor’s core. Full-core reserve refers to the ability of the plant to maintain enough space in the spent fuel pool so that fuel from the reactor can be fully discharged into the spent fuel pool. Scott D. Ferguson, WCNO’s Principal Engineer for Nuclear Fuels, explained: “Full core reserve is a policy and a practice to reserve sufficient cells in the spent fuel pool to allow the discharge of 193 assemblies in our reactor core at any time that we would need to do so.” Tr. at 1143. This is not a regulatory requirement, “but is a common objective for economic and risk management purposes.” Entergy Nuclear Vt. Yankee, LLC v. United States, No. 03-2663C, 2010 WL 3895184, at *7 (Fed. Cl. Sept. 29, 2010). DOE’s breach of the Standard Contract impacted Wolf Creek’s ability to maintain its full-core reserve. Tr. at 1143 (Ferguson).

III. Wolf Creek’s mitigation efforts

Mr. Morris traced back to as early as 1993 Wolf Creek’s beginning to anticipate that, if DOE did not accept its spent fuel by 1998, its full-core reserve space in its spent fuel pool

11/ Burnup denotes “the amount of exposure that the assembly receives in the core.” See Tr. at 142 (Morris); see also Tr. at 45 (Carney) (defining burnup as “the amount of energy in the fuel assembly which was used up during reactor operations”).

would be totally depleted after its refueling outage scheduled for fall 2006, and the plant would be rendered nonoperational in 2009. 12/ See Tr. at 77-78 (“The significance [of increasing future capacity for spent fuel storage being listed in Wolf Creek’s strategic business plan] was that we had determined that we would . . . run out of storage in our spent fuel pool for loss of full core reserve in the fall of 2006. The reason it showed up in the '93 time frame is [that] we determined that we would need to decide . . . what we needed to do. We wanted to decide what we needed to do prior to 1996 so that we would have sufficient time to implement whatever solution that we came up with.”); Tr. at 906-07 (Muench) (“We would have run out of the ability to maintain a full core reserve late in 2006. More importantly, we would have run out of the ability to operate our plant in late 2009.”). 13/ Mr. Morris was tasked with exploring options to create more available space in Wolf Creek’s spent fuel pool. See Tr. at 80 (“Well, I was asked to essentially do what the Strategic Business Plan says here. I collected information about the available technologies and produced a report on . . . what we determined to be feasible for our plant.”).

In a document dated December 20, 1995, titled “Wolf Creek Nuclear Operating Corporation, Spent Fuel Storage Options” (“SFSO”), Mr. Morris tabulated Wolf Creek’s pre-1995 discharge data and projected Wolf Creek’s future discharges and its correlative storage capacities. JX 3 at 9216. His estimates confirmed that Wolf Creek would lose its full-core reserve after a fall 2006 refueling outage. Id. (projecting 107 storage locations after fall 2006, less than full-core reserve of 193).

12/ Engineers at Wolf Creek realized as early as 1989 that it eventually would have to address capacity issues. See Tr. at 72 (Morris) (“Approximately 1989, Mr. Ferguson circulated a memo that detailed issues [regarding] . . . the Yucca Mountain project that would require us to start looking at our . . . capacity. . . . Around '89 is when there was news coming out . . . about Yucca Mountain, that 1998 was not going to be when they began accepting fuel, and that it would be closer to 2010.”).

13/ By 1993 the issue of storage capacity due to an anticipated government breach of the contract became “a higher priority item,” and merited inclusion in Wolf Creek’s “Strategic Business Plan as an issue that we needed to address,” Tr. at 73 (Morris) (“[The] Strategic Business Plan was a document where we would detail all issues that were outstanding – out there that the plant needed to address because it would have a direct impact on the operation of the plant.”); see PX 104 at 7069 (Wolf Creek’s 1993 Strategic Business Plan, stating: “With an estimated loading of 80 assemblies per reload, pool storage will be exhausted . . . in the Fall of 2006.”); PX 111 at 0755 (Wolf Creek’s 1994 Strategic Business Plan for years 1995 to 1999 predicting that “onsite storage of SNF will be required well beyond the current capacity of the Spent Fuel Pool”).

1. Wolf Creek's 1995 spent fuel storage study

Mr. Morris's 1995 report evaluated various options for Wolf Creek to continue storing its SNF on-site. See JX 3 at 9211; Tr. at 80 (Morris). The report broke the options down into six subject areas: (1) Plant Operations/Fuel Design Related Options; (2) Increased In-Pool Spent Fuel Storage; (3) Dry Spent Fuel Storage Technologies; (4) Shipment to a Private Interim Spent Fuel Storage Facility; (5) Shipment to a Federal Storage Facility; and (6) Combinations of Alternatives. JX 3 at 9211. The subject areas were then broken down into more specific alternative plans.

For the first subject involving plant operations or fuel design, the components included no action, which "was to establish a baseline to compare to." Tr. at 82 (Morris). Reduced power operation, another option, would "extend the cycles without going to higher burnups." Tr. at 82-83. Use of higher burnup fuel would have necessitated fuel design changes, and reprocessing the spent fuel "wasn't going on in the United States" at the time of the report, but was an additional alternative technology. Tr. at 81; JX 13 at 9211. For the second category, increased in-pool storage, the options Mr. Morris considered included

possible modification of the new fuel storage vault, 14/ possibly constructing a new pool[,] [a]dding neutron poison to the existing racks[,] 15/ [l]ooking at

14/ Utilizing the new storage vault to store more spent fuel would have required converting the vault to another spent fuel pool. Tr. at 92 (Morris). This presented "a lot of issues" regarding transporting the spent fuel, because Wolf Creek engineers

would have to create a pathway [from the location of the new fuel storage vault] to the transfer canal in order to be able to move fuel from the reactor. The transfer canal connects the spent fuel pool to the refueling pool in containment. And you would have to be able to have connection between the transfer canal and the new fuel storage vault area. That would have required a lot of equipment to be moved, [and] redesign of the plant in a lot of areas. You would have to [] have broken out a lot of concrete and . . . done a lot of work. And it would have been a . . . lot of work around the spent fuel that would have created a lot of debris.

Tr. at 92-93; see JX 3 at 9228-29 (discussing feasibility problems with modification of new fuel storage vault).

15/ Specifically, the report examined whether the space in the existing racks could be maximized by "putting a neutron poison into the racks themselves, thus allowing us to use

[the] potential of licensing soluble boron credit[,] 16/ [r]eracking the existing pool to add more capacity. . . . And then another item was fuel assembly and rod consolidation, where you would pull the rods and put them into another canister and compress the skeleton.

Tr. at 83 (Morris); see also JX 3 at 9211. “[A]ll the different kinds” of available dry storage technologies were considered, Tr. at 83, including concrete and modular concrete storage designs, metal storage designs, dual-purpose transportation casks, and multi-purpose canister

15/ (Cont’d from page 11.)

more cells, and being able to remove the welded caps.” Tr. at 88 (Morris); see JX 3 at 9235-37. The addition of neutron poison to the racks involved two options:

One was to attach the poison—what we call the poison shim, . . . directly to the cell walls. And the other would be Siemens had—Power Corporation had developed a product they called the Rack Saver, which actually attached to the assembly versus the . . . rack, which would allow you to still be able to move the assembly but still have the neutron poison to be able to take credit for that.

Tr. at 88-89.

16/ Boron is a poison that is a neutron absorber. Tr. at 89 (Morris). In a spent fuel pool, boron is found in the pool water, and plants were not permitted to take into account the soluble boron found in the pools to help ensure the subcriticality of the stored fuel. Tr. at 89; JX 3 at 9239. Some plants utilized the boron by installing racks that “included a product called Boraflex as the neutron poison in the racks.” Tr. at 89 (Morris). However, it was later discovered that the Boraflex eventually degraded, which impacted the ability to calculate how much boron was in the material. Tr. at 89.

The Boraflex degradation presented a criticality problem for plants because it impaired a plant’s ability to demonstrate accurate criticality calculations. Tr. at 90 (Morris) (“You couldn’t . . . determine how much boron was still resident in the matrix of the material that was . . . there. And so to continue using the pool, you had to have evidence that you could remain subcritical in the pool.”); see JX 3 at 9239-41.

To remedy this problem, “there was an industry initiative to develop a soluble boron credit methodology that would allow a plant to use that methodology to recover from that situation and be able to use that license—to get that license with the NRC.” Tr. at 89-90 (Morris).

designs, JX 3 at 9211. 17/ The report also examined shipments to the private storage facilities of either the New Mexico-based Mescalero/Utility Fuel Storage Initiative or the Wyoming-based NEW Corporation Initiative and shipments to Federal storage facilities at either the Monitored Retrievable Storage Facility (“MRS”) for interim storage or the Geologic Repository for permanent disposal. Id. at 9211, 9287, 9293. However, political opposition to the private storage facilities created “very high mountains to climb.” Id. at 9287 (“The Mescaleros must overcome state opposition to the project and the NEW Corporation must get the Wyoming Governor to ‘buy off’ on the project.”). Political opposition to selection of an MRS site led Mr. Morris to conclude that “it will be very unlikely that an MRS will be developed.” Id. at 9293.

Last, the report considered three combinations involving dry casks, included the “[p]ossibilities of soluble boron credit and then following up with dry cask, or adding poison to the existing racks followed up with dry casks, or reracking, followed up by dry casks.” Tr. at 84 (Morris); JX 3 at 9211. Of these options Mr. Morris concluded that seven warranted further investigation. Tr. at 94. The options involving use of the existing racks were eliminated once it was determined that the racks could not support additional storage “under the seismic conditions.” Tr. at 95 (Morris). 18/ This left only three options, “either rerack or go straight to dry cask or a combination of that.” Tr. at 95; see also Tr. at 933 (Muench) (“And, basically, the only alternative to reracking our pool at that point would have been what we call dry cask storage.”).

17/ Mr. Morris explained how dry cask storage of spent nuclear fuel works:

Dry storage is a method of, after a period of cooling time in the fuel pool, you could build a pad outside the fuel building, . . . someplace in the protected area. There’s security requirements and various other items.

But the gist of it is you would take a cask and you would lower it into the water. You would load the cooled spent fuel assemblies into that cask. Then you would seal it, evacuate the water, remove it from the pool, not in that order. But then it would have to be washed down, deconned and stuff like that. And then it would be placed in [] storage . . .

Tr. at 86-87.

18/ Mr. Morris elaborated on why the existing racks could not provide all possible storage. The original rack design utilized empty cells for criticality control, a method rendered obsolete due to installation of neutron poison in the racks. Tr. at 87. Further, the “distance center to center for the old racks were . . . a little bit bigger than it had to be, because you had to have the cooling . . . flow up around them for that design.” Tr. at 87.

1) Reracking

Reracking involved removal of the existing racks in the pool and replacing them with higher density racks. Tr. at 87 (Morris). Reracking was favored because the new racks could be spaced closer together than the existing racks, while still maintaining sufficient cooling flow. Tr. at 88. Additionally, criticality control was maintained by utilizing neutron poison, freeing up the empty cells used for criticality in the old racks and allowing for four-to-four storage. See Tr. at 88; JX 3 at 9243. The report predicted that reracking would expand Wolf Creek's spent fuel storage capacity to approximately 2,368 assemblies. JX 3 at 9243. After comparing the economic differences between reracking and going to dry storage, Mr. Morris concluded that reracking was preferable and recommended accordingly. Tr. at 95-96.

Wolf Creek evaluated the reracking plan in conjunction with Union Electric, a St. Louis-based utility that owned the Callaway Nuclear Generating Station ("Callaway"). See Tr. at 926-28 (Muench). Mr. Muench attended a May 13, 1996, steering committee meeting of executives at Wolf Creek and Callaway, at which engineers from both plants presented their respective findings regarding spent fuel pool capacities at the plants. See Tr. at 928-29 (Muench). A consensus was reached in favor of moving forward with capacity expansion through reracking. See Tr. at 929 (Muench); PX 131 (minutes from May 13, 1996 meeting). The committee decided to develop a joint bid specification for proposals from vendors bidding on the rerack projects. See PX 131 at 4016 ("Consensus was reached to jointly pursue Phase 1 of the reracking proposal. This includes the issuance of a joint specification. Vendor proposals are due October 1, 1996."); Tr. at 932-33 (Muench). Mr. Muench recalled:

The steering committee recommended the reracking because we agreed that we needed to maximize the storage capacity in our fuel pools. And, really, . . . because, in fact, we did not expect the government to take fuel from our fuel pools any time soon, even any time soon after 2006. So that was something . . . that would be prudent for us to do. And, basically, the only alternative to reracking our pool at that point would have been what we call dry cask storage. And our information at that time was that reracking the pool was a lot less expensive than dry cask storage. So that's the choice that we made.

Tr. at 932-33.

Following the meeting, the committee did develop a joint specification for bids. Tr. at 933. The committee received bids from three vendors, identified by plaintiffs as Westinghouse, Framatome, and Holtec International. See Tr. at 933; PX 139 at 7348. Of

these three, Holtec was selected as the winning bidder. Tr. at 933. 19/ Holtec was chosen because it was the lowest bidder, 20/ and because it was recognized as a “leader in doing this type of work at that time.” Tr. at 938 (Muench); see also PX 139 at 7348. At a March 11, 1997 Owners Committee meeting of Wolf Creek’s Board of Directors, Mr. Muench recommended to award the contract to Holtec. Tr. at 935. Wolf Creek’s board of directors eventually approved Mr. Muench’s recommendation. Tr. at 934-36. The total cost of the rerack project was approximately \$14 million. Tr. at 956. The amount paid to Holtec was \$8,703,042.00. Factual Stipulations ¶ 21.

2. Holtec reracking project

Although the parties have stipulated that Wolf Creek installed the racks in 2000, see Id. ¶ 20, Ronald W. Holloway, then-project engineer for WCNO, dated implementation of the reracking plan as beginning in fall 1999, Tr. at 1276, 1278. An initial step was modifying the overhead cask crane, a 150-ton crane that provides heavy-lift capabilities from the railroad bay to the pool, in order to provide for greater access to the new storage racks in the pool. Tr. at 1279 (Holloway). The modification gave the crane “that capacity to be able to handle the future shipping cask and also to install the old racks initially. . . . [And] to lift out the heavy old racks and install the heavier new racks.” Tr. at 1279-80 (Holloway). Mr. Holloway explained that the modification of the crane was necessary because it did not have an adequate travel range to install the new racks in the pool, which were “installed closer to the walls to get more storage capacity.” Tr. at 1280 (Holloway)

19/ Mr. Muench described the decisionmaking process at Wolf Creek that led to the selection of Holtec:

The decision making process is one where my people would make a recommendation to me. And I would, in turn, make a recommendation to the President. At that time, I was the vice president. And he in turn would make that recommendation—well, in fact, we would make that recommendation to a committee of the board that we call[ed] . . . the owners committee at that time. That committee would advise the board, which they did. And the board concurred with our recommendation and approved the expenditure to proceed with this project.

Tr. at 934. The Owners Committee is a committee of Wolf Creek’s Board of Directors; see PX 139 at 7341.

20/ Framatome’s bid was \$10,225,000.00; Westinghouse’s bid was \$10,028,140.00; and Holtec’s bid was \$8,672,158.00, respectively. PX 139 at 7348.

(“And we had to extend the range of travel to be able to lift the center line of the rack to those storage positions—installed positions.”).

During the crane modification, electronic travel stops—a safety feature used to protect the crane from damage if it hit a wall—had to be relocated, and then restored to their original configurations once the racks were installed in the pool. Tr. at 1280-81 (Holloway). Because reracking was performed in the summer, temporary air conditioners were installed for the work crews. Tr. at 1282. Wolf Creek personnel performed the preparatory work, including the crane modifications, but the physical work of the actual rerack process was performed by Holtec, Tr. at 1280, 1282, which had responsibility to “design, furnish and install [the] replacement storage racks, as well as to remove and dispose of the old storage racks.” Tr. at 1285 (Holloway). Mr. Holloway explained what was involved in the physical replacement of the racks:

To start the rerack project, we had to move stored spent fuel out of the first four of the [twelve] old racks, to empty those out for removal, and to create safe dive zones, work zones for the divers.

Once those four racks were empty, the racks were cleaned underwater, connections unbolted and some cut with a cutting torch. And then those racks removed, washed, bagged and then placed in a shipping container for off-site disposal.

Once those four racks were out of the pool, we cleaned the floor, cut out some previously installed cooling water pipe and associated supports, and then installed four new racks, shuffled fuel back into those new racks after [they had] been successfully drag tested. And then repeated that process as we moved fuel out of the old racks, creating safe dive zones, and . . . removed the old racks and installed the new ones.

[We] repeated that process until all the old [twelve] racks were out, all the cooling water pipe[s] [were] out, the hangers [were] out, and the new racks installed, drag tested and fuel moved subsequently into all of them.

Tr. at 1285-86. The old rack configuration included cooling water pipes around the perimeter of the pool floor. Because placement of the new racks was closer to the outer wall, the cooling water pipes had to be removed and disposed of along with the old racks. Tr. at 1297. Removal of the old cooling system increased storage capacity.

During implementation of the rerack process, Wolf Creek’s operations personnel operated the crane and handled the fuel. Holtec’s personnel performed the physical work,

including the underwater cleaning, breaking the pipe connections, removal and disposal of old racks, cleaning the floor, and installing the new racks. Tr. at 1286-87 (Holloway). The pace of implementation proceeded according to a “normal day shift activity.” Tr. at 1299 (Holloway) (“We were working five eights during that time.”). However, Wolf Creek’s operations personnel proceeded with fuel shuffling in twelve-hour night shifts to avoid interrupting the day-shift workers. Tr. at 1299-1300. The rerack implementation phase was completed with the installation of fifteen new racks in March 2000. Tr. at 1303.

The next phase of the project involved modifying the spent fuel bridge crane, which provides access to the new storage rack cells. 21/ Because the crane was designed to access the old racks under the original (and now different) pool design, the crane could not provide access to the additional cells. The modifications allowed access to the new storage rack assemblies, the new fuel elevator, and the fuel transfer system that is used to take “fuel assemblies into and out of the reactor building during refueling outages.” See Tr. at 1304 (Holloway). The spent fuel bridge crane modifications were performed in spring 2001. Tr. at 1305. Following installation of the racks, the crane was restored to its previous configuration. Tr. at 1306.

1) Wolf Creek’s resources expended on rerack project

In addition to hiring Holtec, Wolf Creek’s own resources were required to perform the rerack. General oversight of the rerack project was provided by executives and managers. Tr. at 1287 (Holloway). But see Tr. at 1319 (Holloway) (confirming Holtec was an independent contractor); Tr. at 1321 (Holloway did not supervise Holtec’s work); PX 142 at 2236 (showing Holtec as independent contractor); id. at 2237 (Holtec was responsible for performing spent fuel bridge crane extension). Wolf Creek’s engineering groups also provided support to the project, including its reactor engineering, design engineering, systems engineering, support engineering, and safety engineering groups. Tr. at 1287 (Holloway). Other departments working on the rerack, directly and indirectly, included health physics, 22/

21/ “The spent fuel bridge crane is [a] [five]-ton monorail hoist specifically designed to handle the fuel assemblies.” Tr. at 1303-04 (Holloway). It is different from the cask handling crane, which is the “overhead heavy lifting crane with the 150-ton hook crane capacity.” Tr. at 1303.

22/ The health physics department monitors radiation and contamination levels at the plant and controls the amount of exposure to which workers are subjected while they work in radioactive areas. Tr. at 1287 (Holloway). The health physics department assigned technicians to the project for the duration of the physical work in the pool. Tr. at 1287-88; see also 1289-90.

procurement, legal, training, human resources, security, operations such as mechanical and electrical maintenance, instrumentation and control technicians, warehouse receiving security, financial services, and administrative departments. Tr. at 1287-1308.

Many of these departments billed their time directly to the rerack project. However, for several departments Wolf Creek's accounting method "split" the time between capital projects and normal operations in order to derive its indirect cost rates for material and construction overheads. See Tr. at 1387-89 (Thomas J. Robke, who was responsible for all accounting on rerack project from 1997 through 2001). Departments that supported the rerack project but that financial services did not directly charge time to the project include Wolf Creek's executive departments; its design, support, and systems engineering groups;^{23/} and its legal, ^{24/} human resources, financial services, ^{25/} and information services departments. See generally 1389-95, 1506-07 (Robke) (explaining departments' time allocations to rerack project); see also Tr. at 939-40 (Muench) (discussing executive level oversight of rerack project). Mr. Holloway, Wolf Creek's project engineer on the rerack, directly billed to the rerack project. Tr. at 1325.

Wolf Creek's human resources personnel performed background screening checks on Holtec personnel before they arrived at the plant. Tr. at 1282. Human resources also did the "fitness for duty" screening to "enable the workers to be granted unescorted access." Tr. at 1282 (Holloway) ("That's testing to confirm that all workers at the plant are fit for duty. They're not under the influence of some alcohol or drug misuse." (Tr. at 1284)). Once the background screening was complete, Wolf Creek provided training personnel "involved with training for site access." Tr. at 1282 ("Everybody that gets access to the plant has to receive . . . plant access training and radiation worker training[,] [a]nd they have to successfully pass

^{23/} However, Wolf Creek's financial services department also charged the time of some engineering groups directly to the rerack project. See Tr. at 1395, 1437-38, 1471 (Robke). Mr. Robke justified including the engineering department's time in the overhead pool because "a portion of that . . . would represent the supervision and clerical support that those groups require, [and] that is not billed directly to the project." Tr. at 1395.

^{24/} Wolf Creek's legal team reviewed purchase orders for the rerack project. Tr. at 1295 (Holloway).

^{25/} Invoices from Holtec were reviewed by Wolf Creek's financial services department, which then forwarded them to Mr. Holloway for acceptance and approval, who returned the invoices back to financial services for payment. See Tr. at 1294 (Holloway) (financial services reviewed invoices against terms of respective purchase orders, and Mr. Holloway reviewed invoices against reracking progress); see also Tr. at 1392-94 (Robke) (discussing financial services work on rerack project).

examinations confirming they understood the requirements for working in those roles.” (Tr. at 1285)).

With respect to support provided by Wolf Creek’s executives and managers, Mr. Holloway explained that the rerack project “was a pretty big job for us,” and, because it involved handling spent nuclear fuel, “which we take very seriously,” Wolf Creek’s executives provided oversight of the project to ensure that it was “handled well within our work procedures and safety precautions for doing so.” Tr. at 1288 (Holloway); see also Tr. at 939 (Muench) (describing rerack project as “very sensitive,” “very expensive,” and handing nuclear fuel as the “most important thing we do”). Wolf Creek’s executives wanted to be informed whenever problems arose with the rerack project. Tr. at 1288 (Holloway) (“[T]hey wanted to be aware of those [problems] and understand what it would take to resolve that problem and how it fit into the overall schedule.”). For example, one problem that Mr. Holloway reported to Wolf Creek’s executives occurred during the removal of the existing underwater racks when a “diver inadvertently dropped his torch and cut a hole in the floor of the pool,” creating a leak in the pool floor that had to be isolated and repaired. Tr. at 1288-89 (“So that was [an] . . . encountered problem that management needed to be aware of and understand what the solution was and how it was going to be implemented.”).

Wolf Creek’s design engineering group is responsible for the civil, electrical, and mechanical attributes of the plant. Tr. at 1298 (Holloway). The group’s responsibilities involving the spent fuel pool included performing thermodynamic and thermohydraulic calculations and structural evaluations of the racks; loading materials on the pool floors; calculating hydrodynamic loads on the pool walls; and making seismic evaluations. Support engineering’s involvement with the rerack project consisted of monitoring the performance of heat exchangers when assemblies were added to the spent fuel pool. See Tr. at 1298-99 (Holloway) (“And since the rerack job included adding more assemblies into the pool, we had to consider a higher heat load, and [whether] cooling systems [would] be able to handle that higher heat load. So [the support program engineers] were involved in the evaluation of those heat transfer calculations.”); see also Tr. at 1293 (Holloway) (discussing reactor engineers’ involvement with rerack); Tr. at 1298 (Holloway) (discussing safety analysis group). The involvement of the systems engineering group was not developed further.

When material arrived at Wolf Creek, including material for the new racks, Wolf Creek’s warehousing department personnel received and inspected the materials and reviewed any corresponding documentation to verify compliance with the requirements of the appropriate specification. Tr. at 1290-91 (Holloway); see also Tr. at 1401-02 (Robke) (discussing indirect billing of warehouse facilities as component of overhead costs). The new racks were not offloaded at the warehouse, but were taken to the fuel building and offloaded on site. On two separate racks, Wolf Creek’s warehousing personnel “detected some cracked welds that needed to be evaluated and dispositioned.” Tr. at 1291 (Holloway).

While the damage to the cracked welds was not critical, i.e., did not render the racks unusable, it did require “a change package evaluation to confirm the acceptability of that defect.” Tr. at 1291.

PROCEDURAL HISTORY

Plaintiffs’ complaint was filed on January 28, 2004, and from May 14, 2004, until December 1, 2008, the case was stayed at the request of defendant to explore coordinated proceedings. Then, the case was stayed at the parties’ request pending decisions in related cases by the Federal Circuit. Finally, the case was stayed at their request for appointment of a discovery judge to coordinate discovery and develop a litigation plan. By order entered on December 1, 2008, the court called for a further justification for staying the case or a schedule for further proceedings. Plaintiffs proposed a schedule, and the court entered a scheduling order on February 23, 2009. On May 1, 2009, plaintiffs amended their complaint to reflect accurately the length of their lease of Wolf Creek, Compl. ¶ 5; the year of DOE’s anticipated removal of SNF from any utilities, *id.* ¶¶ 15, 18; and the length of DOE’s failure to perform, *id.* ¶ 21. A final scheduling order was entered on January 21, 2010, calling for the commencement of trial on June 7, 2010. This reset date responded to the parties’ joint proposal filed on January 20, 2010.

Motions *in limine* preceded trial. On April 21, 2010, defendant filed Defendant’s Motion *in Limine* To Exclude the Expert Testimony of Dean M. Murphy, Ph.D. Plaintiffs responded on May 12, 2010, and defendant replied on May 21, 2010. Relying on Daubert v. Merrell Dow Pharm., Inc., 509 U.S. 579, 589 (1993), defendant challenged Dr. Murphy’s expert opinions regarding, *inter alia*, the exchange market in forestalling SNF-related storage costs at Wolf Creek in a non-breach world. Although the motion was denied, the court advised that defendant’s objections to Dr. Murphy’s data raised “serious concerns.” Order at 9, Kansas Gas & Elec. Co., et al. v. United States, No. 04-99C (Fed. Cl. May 28, 2010), ECF No. 112 (order denying motion *in limine* to exclude expert testimony):

Defendant argues that Dr. Murphy failed to account for licensed storage capacities and that he failed to gather all reasonably available data when collecting data for discharge projections. Def.’s Br. filed May 21, 2010, at 10-11. Additionally, criticizing Dr. Murphy’s sampling methodology for estimating SNF storage costs, defendant faults Dr. Murphy for limiting his analysis to “just 14 of 118 possible sites,” *id.* at 14, and argues that Dr. Murphy’s failure to obtain and include non-public data from other nuclear utilities compromises his model with a “major risk of bias,” *id.* at 15. Notwithstanding, defendant’s objections are not entirely novel. Because the court previously has considered (over similar objections) expert testimony resembling Dr. Murphy’s exchanges opinion and because defendant’s

objections primarily implicate the weight to be accorded to Dr. Murphy's testimony at trial, the court declines to exclude Dr. Murphy's exchanges opinion.

....

Defendant's remaining objections to Dr. Murphy's exchanges opinion decry Dr. Murphy's use of flawed data for SNF storage capacities, discharge projections, and storage costs. See Def.'s Br. filed Apr. 21, 2010, at 19-33. Regarding storage capacities, defendant argues that Dr. Murphy used purchasers' estimated "maximum storage capacities" rather than the purchasers' "licensed storage capacities" and that Dr. Murphy incorrectly assumes that purchasers will utilize their maximum storage capacities regardless of cost. Id. at 22. Dr. Murphy drew his maximum-capacity data from the DOE's "Spent Fuel Storage Requirements 1994-2042," prepared in June 1995. See id. at A11-A35 (the "SFSR report"). Plaintiffs justify their use of the SFSR report by arguing that the DOE prepared and relied upon the maximum capacity data in the SFSR report, as well. Pls.' Br. filed May 12, 2010, at 11. To the extent that defendant disputes the propriety of Dr. Murphy's factual predicates, i.e., the use of maximum-capacity data, or argues that Dr. Murphy fails to account for any costs associated with purchasers' use of their maximum capacities, these are objections that will go to the weight to be accorded Dr. Murphy's testimony at trial. See Libas, Ltd. v. United States, 193 F.3d 1361, 1366 (Fed. Cir. 1999). As justified by plaintiffs, Dr. Murphy's use of maximum-capacity data, rather than the available licensed-capacity data, does not render the methodology behind his exchanges opinion unreliable for purposes of this motion *in limine*.

Id. at 5, 7.

On April 21, 2010, plaintiffs filed Plaintiffs' Motion To Preclude R. Larry Johnson's Testimony. Defendant responded on May 12, 2010, and plaintiffs replied on May 21, 2010. The court ruled that Mr. Johnson was qualified to opine on the regularity or acceptability of plaintiffs' cost accounting. He could testify as to the types of costs that the industry treats as interest. He could not give an opinion as to whether costs are proscribed prejudgment interest against the United States, although he could opine as to whether costs properly are considered interest for purposes of cost accounting. See Fed. R. Evid. 702; Fed. R. Evid. 704; Order at 1, Kansas City Gas & Elec. Co., et al. v. United States, No. 04-99C (Fed. Cl. May 28, 2010), ECF No. 114 (order granting, in part, plaintiffs' motion to preclude expert testimony).

On April 21, 2010, defendant filed Defendant's Motion *in Limine* To Exclude the Expert Testimony of Professor Jerold Zimmerman. Plaintiffs responded on May 12, 2010, and defendant replied on May 21, 2010. The court's order entered on May 28, 2010, denied the motion and reads, in full:

Defendant seeks to exclude the testimony of plaintiffs' expert Prof. Jerold L. Zimmerman, whom plaintiffs will call as a rebuttal expert to defendant's accounting witness R. Larry Johnson. Plaintiffs make clear that Prof. Zimmerman's qualifications and testimony will be confined to describing what costs are considered in the field of cost accounting properly to be overhead that would have been chargeable to the Government's breach. See Pls.' Br. filed May 12, 2010, at 3. Prof. Zimmerman will not be opining on the calculation or quantification of the damages for Wolf Creek Nuclear Generating Station. See id. He will not seek to support the damages reflecting opportunity costs, but will use the concept of opportunity costs to show that the overhead costs are actual costs. See id. at 6, 8. Of course, this expert must establish that the consideration of opportunity costs as actual or real or overhead costs applies in the context of Mr. Johnson's analysis of plaintiffs' damages claim. Defendant's substantial objections going to the weight to be accorded this apparently theoretical and potentially unmoored testimony should sound a note of caution to plaintiffs. . . .

Order at 1, Kansas City Gas & Elec. Co., et al. v. United States, No. 04-99C (Fed. Cl. May 28, 2010), ECF No. 113 (order denying defendant's motion *in limine* to exclude expert testimony).

On April 21, 2010, plaintiffs filed Plaintiffs' Motion To Exclude Evidence Regarding [Greater-Than-Class-C ("GTCC")] Waste. Defendant responded on May 12, 2010, and plaintiffs replied on May 21, 2010. By corrected order entered on June 4, 2010, the court denied the motion due to the hybrid that this waste has become in the case law. Order at 1, Kansas City Gas & Elec. Co., et al. v. United States, No. 04-99C (Fed. Cl. June 4, 2010), ECF No. 118. On April 21, 2010, defendant filed Defendant's Motion *in Limine* To Preclude Plaintiffs from Contradicting Their Binding RCFC 30(B)(6) Deposition Testimony About Costs They Would Have Incurred in a World of DOE Performance. Plaintiffs responded on May 12, 2010, and defendant replied on May 21, 2010. The court's order denying the motion entered on June 1, 2010 presaged a refrain in this case: "[D]efendant correctly insists that plaintiffs must prove their case regarding costs that they would have incurred due to defendant's partial breach in the "but[-]for" world, and correctly places the burden on them to do so, see [Yankee II, 536 F.3d at 1273]" Order at 1, Kansas City Gas & Elec. Co., et al. v. United States, No. 04-99C (Fed. Cl. June 1, 2010), ECF No. 119 (order denying defendant's motion *in limine*).

At the conclusion of plaintiffs' case-in-chief, defendant moved for judgment on partial findings pursuant to RCFC 52(c). The motion was serious, substantial, and deftly overcome. Post-trial briefing was completed on August 9, 2010. Thereafter, by order entered on September 20, 2010, defendant was allowed leave to file a statement regarding its effort to remove from litigation the issue of GTCC waste.

DISCUSSION

Plaintiffs' suit is for damages that are attributable to the Government's partial breach of the Standard Contract. See Ind. Mich. Power Co. v. United States, 422 F.3d 1369, 1377-78 (Fed. Cir. 2005). The burden on a plaintiff pursuing damages for breach of contract is to establish "(1) a valid contract between the parties; (2) an obligation or duty arising out of the contract; (3) a breach of that duty; and (4) damages caused by the breach." San Carlos Irrigation & Drainage Dist. v. United States, 877 F.2d 957, 959 (Fed. Cir. 1989). The parties agree on the first three elements and, at trial, plaintiffs' lead counsel commented upon the extent to which the parties agreed. See Tr. at 8-10 (Robert L. Shapiro). Indeed, no dispute is present that on October 10, 1984, the parties entered into a valid contract; that an obligation of the Government to accept 27.7 metric tons of uranium arose thereunder; and that the Government failed to perform this duty. See Factual Stipulations ¶¶ 12-13, 15-17 (stipulating existence of valid contract, obligation of Government, and partial breach by Government); Damages Stipulations ¶ 1 (stipulating breach by Government (citing Me. Yankee, 225 F.3d at 1343)). The parties do not agree on the quantum of damages to be awarded to plaintiffs on account of the Government's breach.

I. Standard of review

An injured party to a contract has a duty to mitigate its damages. See Robinson v. United States, 305 F.3d 1330, 1333 (Fed. Cir. 2002) ("[A] party cannot recover damages for loss that he could have avoided by *reasonable efforts*." (quoting Restatement (Second) of Contracts § 350 cmt. b (1981) (emphasis in original))). As such, mitigation damages are available in response to the Government's partial breach of the Standard Contract. Ind. Mich. Power, 422 F.3d at 1375. The damages awarded should be "sufficient to place the injured party in as good a position as it would have been had the breaching party fully performed," id. at 1373, excluding anticipated future costs, id. at 1376. The injured party, i.e., plaintiffs, must show that "(1) the damages were reasonably foreseeable by the breaching party at the time of contracting; (2) the breach is a substantial causal factor in the damages; and (3) the damages are shown with reasonable certainty." Id. at 1373 (citing Energy Capital Corp. v. United States, 302 F.3d 1314, 1320 (Fed. Cir. 2002)).

Foreseeability, causation, and reasonable certainty are questions of fact. Bluebonnet Sav. Bank, FSB v. United States, 266 F.3d 1348, 1355-58 (Fed. Cir. 2001)

(“Bluebonnet III”). Regarding foreseeability, plaintiffs must show that the magnitude and type of damages were foreseeable at the time of contract formation. See Landmark Land Co. v. FDIC, 256 F.3d 1365, 1378 (Fed. Cir. 2001) (discussing reliance damages); see also Citizens Fed. Bank v. United States, 474 F.3d 1314, 1321 (Fed. Cir. 2007) (“What is required is merely that the injury actually suffered must be one of a kind that the defendant had reason to foresee and of an amount that is not beyond the bounds of reasonable prediction.”) (citation omitted) (internal quotation marks omitted)). As for causation, the Court of Federal Claims may apply either a “but-for” test or a “substantial factor” test. See Yankee II, 536 F.3d at 1273-74; Citizens Fed. Bank, 474 F.3d at 1320. The Federal Circuit has stated a preference for the traditional “but-for” test. ^{26/} Yankee II, 536 F.3d at 1273; see also Energy Nw. v. United States, 91 Fed. Cl. 531, 541 (2010) (“[O]ut of an abundance of caution, in this specific spent nuclear fuel case, the Court employs the ‘but-for’ test herein.”).

The Federal Circuit has instructed that “the costs resulting from [a] breach must be reduced by the costs, if any, that the plaintiff[] would have experienced absent a breach.” Bluebonnet Sav. Bank, FSB v. United States, 339 F.3d 1341, 1345 (Fed. Cir. 2003) (“Bluebonnet V”). Breach-of-contract damages should not result in a windfall, i.e., an award beyond that which the plaintiff would have received absent the breach. See LaSalle Talman Bank FSB v. United States, 317 F.3d 1363, 1371 (Fed. Cir. 2003) (“[T]he non-breaching party is not entitled, through the award of damages, to achieve a position superior to the one it would reasonably have occupied had the breach not occurred.”). In expressing its preference for the “but-for” test of causation, the Federal Circuit in Yankee II explained that

26/ Plaintiffs dispute that they have the burden to show causation. “[E]ven if Wolf Creek bore the burden of establishing what it would have done in the non-breach world, I don’t think it would be our burden to prove exactly which of those . . . alternatives Wolf Creek would have done” Tr. at 1578 (Shapiro). Regarding plaintiffs’ claimed damages and as a corollary to plaintiffs’ burden of showing causation, the parties further have stipulated, as follows:

Once an SNF plaintiff meets the applicable standard for proving that its mitigation efforts were caused by the government’s partial breach, internal labor costs may be recovered, provided that the SNF plaintiff proves that it did in fact use its own employees on such efforts, and proves the number of hours those employees spent on such efforts. Such recovery is limited to only those costs arising from the time plaintiffs’ employees spent on mitigation efforts. An SNF plaintiff is not required to prove how those employees working on such mitigation efforts would have spent their time absent the Government’s partial breach.

Damages Stipulations ¶ 4.

an SNF plaintiff must provide “record evidence about [its] condition with full Government performance, [or] the Court of Federal Claims [cannot] perform the necessary comparison between the breach and non-breach worlds and thus [cannot] accurately assess the . . . damages.”^{27/} Yankee II, 536 F.3d at 1273. The Federal Circuit parenthetically included the following mandate: “[I]t is incumbent upon [plaintiffs] to establish a plausible ‘but-for’ world.”^{27/} Id. (quoting Bluebonnet Sav. Bank, FSB v. United States, 67 Fed. Cl. 231, 238 (2005)) (“Bluebonnet VI”) (emphasis added).

Although speculative assessments of damages do not permit recovery, Ind. Mich. Power, 422 F.3d at 1373, damages “need not be ascertainable with absolute exactness or mathematical precision,” id. (internal quotation marks omitted). A plaintiff must be able to provide “a fair and reasonable approximation of the damages.” Energy Capital, 302 F.3d at 1329 (quoting Locke v. United States, 283 F.2d 521, 524 (Ct. Cl. 1960)). The burden then shifts to defendant to prove that plaintiffs’ mitigation efforts were insufficient or unreasonable. See Pac. Gas. & Elec. Co. v. United States, 92 Fed. Cl. 175, 177 (2010), appeal docketed, No. 2010-5123 (Fed. Cir. June 3, 2010); Tenn. Valley Auth. v. United States, 69 Fed. Cl. 515, 523 (2006) (“TVA”). A plaintiff “is not precluded from recovery . . . to the extent that [it] has made reasonable but unsuccessful efforts to avoid loss.” Ind. Mich. Power, 422 F.3d at 1375 (alteration in original) (citation omitted) (internal quotation marks omitted). To the extent that plaintiffs carry their burden, defendant may limit plaintiffs’ recovery by showing that an award of damages must be offset by savings attributable to the breach and established with reasonable certainty. See Westfed Holdings, Inc. v. United States, 407 F.3d 1352, 1370 (Fed. Cir. 2005); see also Bluebonnet V, 339 F.3d at 1345; TVA, 69 Fed. Cl. at 530.

^{27/} The Federal Circuit’s August 7, 2008 SNF decisions clarified that the acceptance rate of SNF in a non-breach world is supplied by the acceptance rate projected in the 1987 “acceptance capacity schedule” (the “ACS process”) published by DOE. See Pac. Gas. & Elec., 536 F.3d at 1285-86; Yankee II, 536 F.3d at 1273; see also Pac. Gas. & Elec. Co. v. United States, 92 Fed. Cl. 175, 177 n.2 (2010) (clarifying that “ACS process” is a moniker invented by the Federal Circuit and has been confused with the “ACR process,” which refers to annual capacity reports, DOE components of the ACS process), appeal docketed, No. 2010-5123 (Fed. Cir. June 3, 2010). In the instant matter, as required by the Federal Circuit, plaintiffs purport to use the ACS process in their non-breach model. See Pls.’ Br. filed April 14, 2010, at 23 (“[Plaintiffs] will demonstrate that in a plausible but-for world with full DOE performance at the acceptance rates based on the 1987 ACR, [they] would not have reracked [their] spent fuel.”).

II. Analysis 28/

1. Causation

Defendant argues that plaintiffs have not established a necessary element of causation: a “plausible ‘but-for’ world.” See Tr. at 1604-05 (defendant’s lead counsel Christopher J. Carney) (citing Yankee II, 536 F.3d at 1273). Plaintiffs contend that they have presented sufficient evidence of plausible “but-for” alternatives to the breach world. See Tr. at 1578 (Shapiro). At trial defendant sought to undercut these alternatives so that the record would reflect only an unreliable “but-for” model against which to juxtapose the breach world. Defendant also criticized plaintiffs’ proof of “but-for” costs as insufficient. See Tr. at 2037, 2064-65 (Carney). Plaintiffs conceded that their alternatives could not be established with absolute certainty, but they did not allow that such “uncertainty” undermined the plausibility of their “but-for” alternatives. Tr. at 1999 (Shapiro). Rather, plaintiffs suggested that any uncertainty was a consequence of the Government’s breach and, accordingly, an issue best treated as an offset, laying the burden of proof with defendant. See Tr. at 2004-11, 2015-16 (Shapiro).

Resolution of this case has been bedeviled by defendant’s resistance to plaintiffs’ contention that, once they have put forward plausible steps that they would have taken to mitigate damages, any uncertainty in proof should be borne by the Government as the breaching party. More directly, plaintiffs charge defendant with the burden of proof because the Government seeks to reduce their damages for mitigation. See Pls.’ Br. filed July 16, 2020, at 15, 16; Pls.’ Br. filed Aug. 9, 2010, at 4. Both Federal Circuit cases cited in support, American Capital Corp. v. FDIC, 472 F.3d 859 (Fed. Cir. 2006), and Westfed Holdings, 407 F.3d 1352, discuss the burden of proving reliance damages, or losses that the nonbreaching party sustained as a result of the breach. See Westfed Holdings, 407 F.3d at 1369-70 (citing Restatement (Second) of Contracts § 349). Westfed Holdings assigns to the Government the burden to prove an offsetting benefit retained by the nonbreaching party. 407 F.3d at 1370. The breaching party must prove what expenditures would have been lost absent the breach. Id. However, the Government must discharge its burden of proof only after the nonbreaching party offers proof of damages based on its reliance interest. See id. at 1369-70. The following language in American Capital nevertheless energizes plaintiffs’ position: “[By] choosing to breach the contract, the government chose to shoulder the burden of proof under the reliance theory of damages. See Restatement [(Second) of Contracts] § 352 cmt. a (“Doubts are generally resolved against the party in breach.”).” 472 F.3d at 869. Section 352

28/ Foreseeability of the rerack project as a reasonable and necessary consequence of the breach is not an issue. The timing of the project is material, as defendant takes the position that plaintiffs’ damages should be offset by the benefits to Wolf Creek in operating at full-core reserve in the “but-for” world.

of the Restatement (Second) of Contracts describes the risks of uncertainty in proving damages, not the burden of proof. Moreover, American Capital does not purport to charge defendant with the initial burden of proving reliance damages. See id. (“[T]he injured party . . . may be able to prove what expenditures it made in relying on the contract. . . . At that point, we shift the burden to the breaching party and allow it to prove what expenditures would have been lost despite the breach.”).

Plaintiffs in the case at bar did not seek to prove reliance damages; rather, under the “but-for” paradigm, plaintiffs sought to prove that any costs that they would have incurred had the Government performed would have been minimal. Plaintiffs did prove that they incurred most of the direct costs of the rerack project (the parties having stipulated to a major part). The Federal Circuit established that SNF plaintiffs, as partial breach claimants, can recover for pre-breach mitigation damages. Extending the rule that the injured party has a duty to mitigate damages incurred after a total breach to recovery of damages in contemplation of a partial breach, the Federal Circuit in Indiana Michigan Power, 422 F.3d at 1375, established the right of utilities in SNF cases to recover for reasonable but unsuccessful efforts to avoid the loss. The court reasoned:

It is beyond debate that because the government unequivocally announced in 1994 that it would not meet its contractual obligations beginning in 1998, the utilities were in fact obligated to take mitigatory steps. It would have been improvident for Indiana Michigan to have waited until January 1989 before deciding what to do with its nuclear waste. Indeed, the losses which the utilities are obligated to mitigate are not merely pecuniary unto themselves, e.g., the increased cost of obtaining storage for SNF on short notice. Having been placed in a position where they are required to find alternate storage for SNF, the utilities must *de facto* accept responsibility to guard against the environmental impact of improperly-disposed and maintained SNF, a situation which the NWPA was enacted to avoid.

Id.

As an original proposition, had this case been tried before Yankee II was handed down, this court would have limited plaintiffs’ burden of proof on direct costs to proving up the damages attributable to the rerack project—and the parties have stipulated to approximately \$9.4 million out of \$9.8 million claimed. See Factual Stipulations ¶¶ 21-22; PX 250. Defendant would have been tasked with proving that plaintiffs would have had to pursue, and incurred costs for, one of the alternatives that Wolf Creek explored (or other steps that Wolf Creek would have taken) to meet its need to operate at full-core reserve absent the breach. This problem in resolving who bears the burden of proof arises because the applicable legal standards derive from the Winstar precedents, as applied to SNF partial-

breach damages cases, that involve costs that the utilities allege that they would not have incurred absent the Government's breach. See Winstar v. United States, 518 U.S. 839 (1996); Yankee II, 536 F.3d at 1272-73 (citing, *inter alia*, Glendale Fed. Bank, FSB v. United States, 239 F.3d 1374, 1380 (Fed. Cir. 2001); Bluebonnet VI, 67 Fed. Cl. at 238). In the instant case, plaintiffs resist the notion that they must prove costs that they did not incur and for which they do not claim. They attempted to prove that they would not have incurred costs through their various hypothetical alternatives, and, as will be discussed, they failed to prove that any of them would have been "the solution," but defendant, for its part, did not prove what costs plaintiffs would have incurred to operate at full-core reserve. Thus, to the extent that defendant seeks a reduction in plaintiffs' evidence of costs for the rerack, the court would have placed that burden on the Government. But that is not the law.

2. A plausible "but-for" world

"Plausible" is a nondescript qualifier and "plausibility," a nebulous standard. The provenance helps to understand how it should be applied. "Plausible" entered the SNF lexicon through Yankee II. See 536 F.3d at 1273. Describing the juxtaposition of a breach world with a non-breach world as a "necessary comparison," *id.*, the Federal Circuit parenthetically quoted a Winstar trial decision for the corollary that plaintiffs must establish a "plausible 'but-for' world," *id.* (quoting Bluebonnet VI, 67 Fed. Cl. at 238). That Winstar decision, Bluebonnet VI, 67 Fed. Cl. at 238, followed a second remand from the Federal Circuit. The trial court evaluated whether the plaintiffs' pursuit of expectancy damages—as opposed to reliance or restitution damages—altered the Government's burden to prove that the plaintiffs' recovery should be limited by an offset. See id. It concluded that

the type of damages sought in this case varies the burden of proof. . . . This court has held that [w]ith respect to explaining its expectancy damages . . . [a] plaintiff bears the burden of propounding a realistic but-for scenario. In other words, plaintiffs bear the burden of demonstrating what might have been. Accordingly, because plaintiffs in this case are seeking expectancy damages, it is incumbent upon them to establish a plausible but-for world.

Id. (second alteration in original) (emphasis added) (citations omitted) (internal quotation marks omitted).

In all, five Bluebonnet decisions preceded Bluebonnet VI, 67 Fed. Cl. at 238, and its "plausible 'but-for' world." The trial court initially denied the recovery of damages, notwithstanding an earlier finding of liability for the Government's breach of contract. See Bluebonnet Sav. Bank, FSB v. United States, 47 Fed. Cl. 156, 186 (2000) ("Bluebonnet II") (denying damages following finding of liability in Bluebonnet Sav. Bank, FSB v. United States, 43 Fed. Cl. 69, 79 (1999) ("Bluebonnet I")), rev'd, 266 F.3d 1348 (Fed. Cir. 2001).

Bluebonnet I held that the Government had breached capital and dividend forbearances granted to plaintiffs—a private investor, a thrift and a thrift-holding company—by the Federal Savings and Loan Insurance Corporation. See Bluebonnet I, 43 Fed. Cl. at 71, 79. According to Bluebonnet II, the plaintiffs did not establish their damages with reasonable certainty. Bluebonnet II, 47 Fed. Cl. at 186. On appeal the Federal Circuit agreed that the plaintiffs did not prove their “but-for” world; hence, the trial court properly had rejected part of the plaintiffs’ damages. See Bluebonnet III, 266 F.3d at 1358. However, because the plaintiffs had substantiated the rest of their damages, the Federal Circuit reversed and remanded with instructions to formulate an appropriate award for the remainder. See id.

In its decision after the first remand, the trial court awarded one-hundred percent of the remainder of plaintiffs’ damages. See Bluebonnet Sav. Bank, FSB v. United States, 52 Fed. Cl. 75, 77-78 (2002) (“Bluebonnet IV”), vacated per curium, 339 F.3d 1341 (Fed. Cir. 2003). The Federal Circuit vacated and again remanded the decision. See Bluebonnet V, 339 F.3d at 1346. The Federal Circuit rejected the parties’ “all-or-nothing” calculations,²⁹ while reiterating the trial court’s charge: “To derive the proper amount for the damages award, the costs resulting from the breach must be reduced by the costs, if any, that the plaintiffs would have experienced absent a breach.” Bluebonnet V, 339 F.3d at 1345. Although the details of a “but-for” world “may be difficult to resolve,” id., such an inquiry is necessary “in order to ensure that the [award] sought by the plaintiffs does not represent an overstatement of the loss fairly attributable to the breach,” id. Bluebonnet V instructed the trial court to “ascertain the net financial effect of the breach on the plaintiffs.” Id. at 1346.

Following Bluebonnet V, the trial court stated that “it is incumbent upon [plaintiffs] to establish a plausible ‘but-for’ world.” Bluebonnet VI, 67 Fed. Cl. at 238 (emphasis added). The trial court noted that in Bluebonnet III the Federal Circuit had approved the “but-for” analysis found in its first damages decision, Bluebonnet II, by which the court partially denied the recovery of plaintiffs’ damages. See id. (“[P]erhaps more significantly, in Bluebonnet III, the Federal Circuit affirmed this court’s rejection, after trial, of

²⁹/ While rejecting the trial court’s award of “all” damages to the plaintiffs, see Bluebonnet IV, 52 Fed. Cl. at 77-78, the Federal Circuit in Bluebonnet V also advised:

While we believe a remand is required for the trial court to conduct the inquiry into the but-for financing costs, we again reject the government’s argument that it should pay no damages at all. We reiterate the point made in our prior opinion [Bluebonnet III] that, at a minimum, jury verdict damages would be appropriate in this case.

Bluebonnet V, 339 F.3d at 1346.

plaintiffs' . . . damages [that failed the 'but-for' model]."). This part of plaintiffs' damages—which, according to the Federal Circuit, was denied properly—“was based on the costs of financing in the actual world and a hypothetical but-for world based on assumptions of what should have happened absent the breach.” Bluebonnet III, 266 F.3d at 1358. The plaintiffs had contended that, in the “but-for” world, they would have obtained capital infusions through loans at a “speculative” interest rate and that they would have repaid their debt promptly. Id. However, the plaintiffs presented no evidence “that anyone would have loaned [plaintiffs] the funds,” id., and the only witness who testified as to the interest rate predicated the availability of the rate on contingencies for which no evidence was introduced, id. The Federal Circuit assessed that the trial court “properly concluded that the evidence was insufficient to determine the quantum of . . . damages to a reasonable certainty.” Id.

The parties in the instant case agree that plaintiffs must establish a plausible “but-for” world. See Def.’s Br. filed July 16, 2010, at 3; Pls.’ Br. filed Aug. 9, 2010, at 1; see also Tr. at 10-11 (Shapiro). Plaintiffs’ burden to show a plausible “but-for” world must be consistent with the explicit charge in Yankee II that an SNF plaintiff is tasked to provide “record evidence about [its] condition with full Government performance, [or] the Court of Federal Claims [cannot] perform the necessary comparison between the breach and non-breach worlds and thus [cannot] accurately assess the . . . damages.” Yankee II, 536 F.3d at 1273. The trial court must be able to determine—although it “may be difficult to resolve,” Bluebonnet V, 339 F.3d at 1345—the net financial effect of the breach “in order to ensure that the [award] sought by the plaintiffs does not represent an overstatement of the loss fairly attributable to the breach,” id. Additionally, the court infers from Bluebonnet III that “plausibility” requires an assessment of the evidence that would establish the attainability of the “but-for” model. This burden may require plaintiffs to introduce evidence as to each link of an attenuated chain of events. The Federal Circuit’s discussion pertaining to the flawed “but-for” world in Bluebonnet III follows:

The [trial] court correctly noted that there was no evidence presented that anyone would have loaned [the plaintiffs] the funds required for the capital infusions at [the speculative interest rate]. The only witness that suggested [the speculative interest] rate made that statement contingent on [the plaintiffs’] converting a short-term \$35 million loan to long-term financing in advance[,] and there was no evidence presented about the feasibility of that refinancing or the rate that would be available. The Court of Federal Claims correctly found that without long-term financing for this loan, it was highly unlikely that willing investors would have been found for the capital infusions.

Bluebonnet III, 266 F.3d at 1358. In Bluebonnet II the plaintiffs failed to demonstrate the attainability of the several conditions precedent that were necessary to obtain the low-interest loans that were central to plaintiffs’ “but-for” world. See id. To the extent that these

conditions precedent were speculative, the plaintiffs' scant evidence only illuminated these deficiencies and undermined the plaintiffs' hypothetical model. See id. ("The only witness that suggested this rate made that statement contingent").

Plaintiffs in the case at bar advance alternative "but-for" worlds, of which "[a]ny of them taken individually . . . would be more than enough to be considered plausible by the court." Tr. at 1578 (Shapiro). Plaintiffs contend that it is not their "burden to prove exactly which of those . . . alternatives Wolf Creek would have done" and then deduct the cost of implementing that option. Tr. at 1578. The court agrees that the required proof of a plausible "but-for" world—particularly, plaintiffs' evidence of costs—is not inconsistent with plaintiffs' obligation to provide "a fair and reasonable approximation of damages." 30/ Locke, 283 F.2d at 524 ("If a reasonable probability can be clearly established, uncertainty as to the amount will not preclude recovery."); see also Energy Capital, 302 F.3d at 1329 ("Certainty [of damages] is sufficient if the evidence adduced enables the court to make a fair and reasonable approximation of the damages. In circumstances such as these we may act upon probable and inferential as well as direct and positive proof." (alteration in original) (quoting Locke, 283 F.2d at 524)). For plaintiffs, any alternative satisfying the but-for burden will suffice; thereafter, however, the court must select the most likely alternative in order to formulate an award of damages.

3. Plaintiffs' "but-for" alternatives

Plaintiffs contend that "multiple options [were] available to [Wolf Creek] in the nonbreach world to avoid the costs it incurred to rerack its spent fuel pool." Pls.' Br. filed Apr. 14, 2010, at 23. On the one hand, "Wolf Creek could have avoided running out of space in its spent fuel pool even if it had relied solely on its OFF [oldest fuel first] allocation of acceptance [the 'OFF model'] under the 1987 ACR acceptance rate." Id. at 7 (emphasis added). Alternatively, Wolf Creek "could have used exchanges to alter the timing of its acceptance rights from its initial OFF allocation [the 'exchanges model']." Id. at 23. To the extent that the exchanges model proves untenable, however, plaintiffs offer three "fallbacks" intended to bolster their OFF model. See Tr. at 2007 (Shapiro). Plaintiffs contend that, by accounting for the soluble boron in the SNF pool (the "soluble boron fallback") or the rod cluster control assemblies ("RCCAs") in the storage racks (the "RCCA fallback"), Wolf Creek would have avoided additional storage charges. See Tr. at 1578-82, 2007-09

30/ The court seeks harmony between the "plausible 'but-for' world" standard of Yankee II and the Federal Circuit's guidance that damages "need not be ascertainable with absolute exactness or mathematical precision." Ind. Mich. Power, 422 F.3d at 1373 (internal quotation marks omitted); see also LaSalle Talman Bank, 317 F.3d at 1374 ("[W]hen damages are hard to estimate, the burden of imprecision does not fall on the innocent party.").

(Shapiro); Pls.’ Br. filed Apr. 14, 2010, at 25. To that end, Wolf Creek also could have installed “rack-savers” (the “rack-savers fallback”). See Tr. at 1583, 2007 (Shapiro); Pls.’ Br. filed Apr. 14, 2010, at 25.

1) The OFF model

Absent a viable fallback, plaintiffs’ OFF model, relying on the sufficiency of storage in Wolf Creek’s facility for the duration of the contractual time line established in the 1987 acceptance rate, is not a plausible “but-for” world. Essentially, but for the breach, plaintiffs argue that they would not have incurred any additional costs. In a non-breach world, SNF collections would have commenced on January 31, 1998. Factual Stipulations ¶ 13. As recently held, DOE would have collected GTCC waste, as well, but as HLW. See Yankee II, 536 F.3d at 1278-79. The Standard Contract allocated collections according to OFF, i.e., according to the chronological order of past discharges. JX 1 at 9749-50 (“[A]cceptance priority shall be based upon the age of the SNF and/or HLW as calculated from the date of discharge of such material from the civilian nuclear power reactor.”); see Tr. at 1046 (Lake H. Barrett, retired Deputy Director at DOE) (“[T]he concept was that the utilities have the allocation based on oldest fuel first, which is the oldest fuel that they discharged from their reactor. . . . And the DOE would, you know, pick up the fuel and work with the utilities on those rights.”). The parties agree that, discounting GTCC, the first scheduled collection of Wolf Creek’s surplus SNF would have been in 2006. See Factual Stipulations ¶ 15. Trial revealed that concurrent acceptance of SNF and GTCC would not have postponed or displaced Wolf Creek’s OFF-scheduled allotment. But 2006 would have been one year too late for Wolf Creek; by spring 2005, accumulating SNF would have overcome Wolf Creek’s dwindling available storage, necessitating alternative storage measures.

Wolf Creek’s old storage racks “had an actual maximum [storage] capacity of 1,327 SNF assemblies,” id. ¶ 11, with these assemblies split between 1,128 in a Region 2 configuration and 199 in a permanent Region 1 configuration, id. Whether Region 1 or Region 2, each rack had groupings of four storage cells; however, because Wolf Creek used empty cells to control criticality, it did not store SNF in all four cells of a storage rack. See Tr. at 84-85 (Morris). Wolf Creek sealed the empty cells with a cap. Tr. at 85. A Region 2 configuration used three out of four cells, leaving one cell empty. Tr. at 85. A Region 1 configuration used two out of four cells. Tr. at 85. Wolf Creek’s reactor engineering department calculated the initial number of Region 1 and Region 2 assemblies by evaluating initial enrichment levels, burnup projections, and the physical limitations of the cells. Tr. at 141 (Morris). If an assembly “achieve[d] the burnup required for the enrichment of that assembly,” it could be stored in a Region 2 configuration. See Tr. at 143 (Morris). Assemblies demonstrating less burnup required a Region 1 configuration. See Tr. at 143.

In reality, the use of 1,327 assemblies prior to reracking was highly unlikely for three reasons. First, Wolf Creek maintains a “full-core reserve,” i.e., the minimum number of empty assemblies required to offload the entire reactor core in the event there was something necessitating removal of the fuel from the core. See Tr. at 106-07 (Morris). When operating, Wolf Creek’s reactor uses 193 fuel assemblies, Factual Stipulations ¶ 9, hence, full-core reserve requires 193 empty assemblies, Tr. at 191. Mr. Morris confirmed that Wolf Creek has maintained its full-core reserve without exception for twenty-five years. Tr. at 148. On cross-examination Mr. Morris agreed with the description of two incidents that would require full-core reserve: a refueling outage or a problem requiring work within the reactor. Tr. at 148. In the event of the latter, fuel left in the core would pose a radiation hazard to maintenance or construction teams; unable to offload the reactor core, Wolf Creek likely would shut-down the reactor and purchase replacement power from an outside source. Tr. at 148-49. Speaking for Wolf Creek’s management, Mr. Muench avowed: “We are always managing the risk [at Wolf Creek], the commercial . . . as well as radiological and safety risk. We had maintained a policy to maintain full core reserve in case we ever needed it.” Tr. at 954-55 (Muench); see also Tr. at 1143 (Ferguson) (“Full core reserve is a policy and a practice to reserve sufficient cells in the spent fuel pool to allow the discharge of 193 assemblies in our reactor core at any time that we would need to do so.”).

Second, mechanical and fuel performance issues forced the early discharge of a number of Wolf Creek’s fuel assemblies from the reactor core. Tr. at 155. Discharged early, these assemblies did not attain the threshold burnup that was required for Region 2 storage. Tr. at 155; see also Tr. at 112 (Morris) (“[W]e had a few assemblies that did not qualify for region 2 storage. They didn’t achieve enough burnup to be stored there.”). Referred to as “low-burnup spent fuel” or “low-burnup assemblies,” these discharges required Wolf Creek to convert Region 2 configurations into Region 1 configurations. Tr. at 155. With this conversion, one of the cells otherwise available for storage would be blocked, resulting in one less space to store an assembly for each “Region 2 to Region 1” conversion. Tr. at 154-55; see Tr. at 188 (Morris) (describing capping of Region 2 spaces with “removable lead-in guides”). Accordingly, because Region 1 required a two-to-four configuration and Region 2 required a three-to-four configuration, one storage space was lost for every two low-burnup assemblies that required Region 1 storage. 31/ See Tr. at 157. When Mr. Morris published

31/ For the early “Region 2 to Region 1” conversions, Wolf Creek used a conservative measure for converting Region 2 configurations, with “a few more caps” used to seal additional empty cells. Tr. at 158 (Morris). Thus, early conversions resulted in the loss of more than one storage cell for every two low-burnup assemblies. Mr. Morris’s 1995 study registered the loss of twenty-three cells for thirty-six low-burnup assemblies. See Tr. at 157 (Morris) (agreeing that more than one space was lost for every two assemblies, but explaining it had “to do with the [initial] transition region from region 1 to region 2” and thereafter “its one for every two”).

his December 20, 1995 SFSO study, Wolf Creek already had discharged thirty-six low-burnup assemblies, and Wolf Creek expected an increasing number of low-burnup assemblies in future cycles. See Tr. at 115 (Morris) (“[B]y the time of the rerack, that number [thirty-six] had increased to 95.”); Tr. at 160 (Morris) (“Over time, . . . it increased. . . . So we ended up discharging some assemblies that didn’t qualify for region 2 in addition to the ones that . . . had mechanical issues.”).

Third, Wolf Creek did not allow SNF storage in eighteen “administratively controlled” cells. See Tr. at 97, 100, 128, 186-87 (Morris). Wolf Creek has two gates, “one between the spent fuel pool and the transfer canal, and one between the pool and the cask loading pit.” Tr. at 97-98 (Morris). As Wolf Creek shifted either gate from a storage location to an installed location or vice-versa, a heavy load would pass over proximate storage cells. See Tr. at 100. If the load were to drop, the SNF could be damaged. Tr. at 100. Mr. Morris described “a heavy loads requirement that, anything over a certain weight cannot be pulled over—held over—or transported over fuel without doing the appropriate analysis to show that, if it was to drop, that it would not damage the fuel, causing a release.” Tr. at 100. Together, the two groups of proximate storage cells comprised the eighteen administratively controlled cells for which Wolf Creek “had not, at that time, done the heavy loads analysis to justify allowing [it] to store fuel in those cells.” Tr. at 98 (Morris).

Notwithstanding these limitations, plaintiffs argue that Wolf Creek could have maintained its full-core reserve until fall 2006. See Tr. at 906-07 (Muench) (“We would have run out of the ability to maintain a full core reserve late in 2006.”). In this “but-for” world, a rerack project would have been unnecessary because DOE, according to OFF, would have picked up Wolf Creek’s surplus SNF in 2006, prior to the loss of full-core reserve. Plaintiffs rely on Figure 2.1 of the Wolf Creek SFSO, a table entitled “Wolf Creek Spent Fuel Pool Inventory for ‘No Action’ Alternative.” See JX 3 at 9216. In Figure 2.1 Mr. Morris tabulated Wolf Creek’s available, i.e., pre-1995, discharge data, and he projected Wolf Creek’s future discharges and its correlated storage capacities. 32/ Id. According to Mr. Morris, Wolf Creek would lose its full-core reserve after a fall 2006 refueling outage. Id. (projecting 107 storage locations after fall 2006, less than full-core reserve of 193); see also PX 104 at 7069 (Wolf Creek’s 1993 Strategic Business Plan, stating: “With an estimated loading of 80 assemblies per reload, pool storage will be exhausted . . . in the Fall of 2006.”); PX 111 at 0755 (Wolf Creek’s 1994 Strategic Business Plan, stating: “With an estimated loading of 84 assemblies per reload, pool storage will be exhausted . . . in the Fall of 2006.”). However, in a footnote Mr. Morris qualified Figure 2.1, as follows: “Ignores the effect of low burnup discharge assemblies with the assumption that these assemblies will be licensed

32/ “The purposes [sic] of this table for use in this report was to establish the baseline of when we would lose full core reserve or loss of ability to operate, for comparison to the other options that are discussed in the report.” Tr. at 108 (Morris).

for Reg. 2 storage with RCCA insertion.” 33/ JX 3 at 9216; see Tr. at 112-13 (Morris) (testifying as to the same); see also Tr. at 908-09 (Muench) (predicating 2006 loss of full-core reserve on RCCA insertion or other fallback). But see Tr. at 977-78 (Muench) (agreeing that full-core reserve in plaintiffs’ “but-for” world depends on use of 1,327 assemblies). Further, he assumed that Wolf Creek would have performed a gate-drop analysis in order to utilize its eighteen administratively controlled cells. 34/ Tr. at 186-87 (Morris).

The viability of plaintiffs’ OFF model rests on Wolf Creek’s ability to maintain its full-core reserve until 2006. Nevertheless, Figure 2.1 and Messrs. Morris and Muench were consistent: because of its low-burnup spent fuel, Wolf Creek would have compromised its full-core reserve prior to that date; 35/ see DX 12 at 3191 (Mr. Ferguson’s July 28, 1995 interoffice correspondence proposing solutions to low-burnup spent fuel); DX 14 at 3672 (Mr. Morris’s December 20, 1996 report advising of “a much larger number” of low-burnup assemblies); Tr. at 1214-15 (Ferguson) (agreeing that solutions to low-burnup spent fuel would have “taken some time”). Moreover, even if Wolf Creek had reclaimed its eighteen administratively controlled cells, the evidence indicates that full-core reserve would have been lost in 2005, not 2006.

Defendant’s cross-examination of Mr. Morris delved into Wolf Creek’s records of low-burnup assemblies. See Tr. at 169-83 (discussing PX 223 and PX 241). Cumulatively, Wolf Creek had discharged ninety-five low-burnup assemblies by spring 1999; that total rose to 103 by fall 2000, 111 by spring 2002, and 121 by fall 2003. See Tr. at 175-82 (Morris); DX 104. In a two-of-four Region 1 configuration, 121 low-burnup assemblies required approximately 240 spaces. Tr. at 184. In converting the three-of-four Region 2 configurations into Region 1, Wolf Creek would have lost approximately sixty spaces, see Tr. at 184-85, or seventy-eight total when adding the eighteen administratively controlled cells, see Tr. at 188. Even without the administratively controlled cells, however, subtracting sixty cells from the projections in the Wolf Creek SFSO table meant that Wolf Creek would have lost its full-core reserve in 2005. See Tr. at 188-89; JX 3 at 9216 (the Wolf Creek

33/ He also advised that his projections “ignore[] the current effect of rack inserts with the assumption that the rack inserts will be completely removed before they become a factor in this analysis.” JX 3 at 9216.

34/ According to Mr. Muench, a gate-drop analysis would have cost Wolf Creek under \$100,000.00. See Tr. at 926.

35/ In Figure 2.1, Messrs. Morris and Muench also confirmed that Wolf Creek needed credit for its RCCA insertions if its full-core reserve was to last until 2006. This express condition undermines plaintiffs’ OFF model. The court discusses the RCCA fallback, the soluble boron fallback, and the rack-savers fallback later in this opinion.

SFSO table, showing 199 available storage spaces in 2005, only six above Wolf Creek's full-core reserve).

Projections both preceding and subsequent to the Wolf Creek SFSO table yielded the same conclusion. Mr. Garrett's interoffice correspondence dated January 6, 1993, over two years prior to the Wolf Creek SFSO table, indicated that Wolf Creek "must have additional spent fuel storage arrangements in place prior to 2006 in order to maintain full core off-load capability . . ." PX 99 at 3997 (emphasis added). Several years later, on January 27, 1998, Mr. Ferguson sent a letter to Mark Soler, Project Manager for Holtec, with an attachment stating that "Wolf Creek's loss of full core discharge capability occurs in 2005." DX 18 at 9304; see also Tr. at 1200-01 (Ferguson). A presentation given by Wolf Creek to the NRC on May 13, 1998, stated that Wolf Creek would experience a "[l]oss of full-core discharge capability - in Cycle 15 beginning in 2005." DX 21 at 2547; see also Tr. at 1205-07 (Ferguson) (disclaiming knowledge of the reason for this conclusion). Wolf Creek fact sheets dated March 27, 1998, and December 20, 1998, respectively, stated that "[p]rojections for spent fuel discharge indicate a resulting loss of full-core off-load at the completion of the Spring of 2005 Refueling Outage . . ." DX 19 at 2520; DX 22 at 8373; see also Tr. at 1209-10 (Ferguson) (disclaiming knowledge of reason for conclusion drawn in DX 22). A September 22, 2000 report prepared by Mr. Holloway stated that "[c]urrent projections . . . indicate the loss of full-core discharge capability will occur at the end of Cycle 14 in 2005." DX 43 at 9954; see also Tr. at 1315 (Holloway). A summary of Wolf Creek's engineering projects advised of spring 2005 for the loss of full-core reserve. See DX 36 at 6052; see also Tr. at 998-99 (Muench). But see Tr. at 1035 (Muench) (minimizing import of DX 36 because "[h]aving concluded that we needed to rerack, [the revised date] really didn't make too much difference").

Plaintiffs' proof that they would not have incurred interim storage costs was undercut by the projections of their expert in energy economics and modeling competitive markets in energy services, Dr. Dean M. Murphy, a principal in the Brattle Group. See Tr. at 388-89 (Murphy). He tabulated data indicating that, in a "but-for" world, Wolf Creek would have had 233 available storage cells in 2005 and 212 available storage cells in 2006. See DX 57 at 0594. However, Dr. Murphy did not reduce these projections for low-burnup spent fuel and the number of spaces lost in the conversion process. Consequently, even with the use of its administratively controlled cells, Wolf Creek would have had dipped below its full-core reserve of 193 in both 2005 and 2006 if it capped sixty additional cells on account of low-burnup spent fuel. See Tr. at 190-91 (Morris).

Plaintiffs could not establish that Wolf Creek would have forgone maintaining its full-core reserve in lieu of arranging additional SNF storage. See Tr. at 465-66 (Murphy) (stating that Wolf Creek could dip below its full-core reserve for one or two discharge cycles). Plaintiffs would have the court accept that full-core reserve was a discretionary policy,

permissibly waived for legitimate economic concerns. Mr. Morris testified that “[m]aintaining full core reserve is not a regulatory requirement. It’s . . . something we prefer to do.” Tr. at 107; see also Tr. at 1143 (Ferguson) (describing full-core reserve as a “policy and a practice”). Mr. Muench stated, as follows:

It is our choice to as to whether we maintain full core reserve. It’s not a licensing requirement or a design requirement. We are always managing the risk in our plant, the commercial . . . as well as the radiological and safety risk.

We had maintained a policy to maintain full core reserve in case we ever needed it. But we had never been confronted with a situation where we would do that, and in order to do that, spend many millions of dollars to do that.

If we had been confronted with that kind of a decision making process, I believe that if we had to choose between reracking and forgoing full core reserve for one fuel cycle, we would have forgone full core reserve for one fuel cycle.

I think the risk would have been low. And the benefit would have been high to have done that.

....

....We could have, clearly if we’re just talking about one fuel cycle, I think we would have foregone, instead of spending \$14 million on a reracking job.

Tr. at 954-56. He described the probability as “extremely low” that Wolf Creek would experience an emergency requiring the use of its full-core reserve. Tr. at 955. Witnesses could not recall any incidents at other commercial nuclear utilities during which an entire reactor core was offloaded. See Tr. at 956 (Muench) (“If you look at all of the reactors that have shut down in an unplanned fashion over the years, it’s generally . . . all kinds of equipment that are not in the reactor.”); Tr. at 1182 (Ferguson) (“I previously testified that there have been examples of plants that have had situations where they had the opportunity to offload their reactor core to the pool and chose not to do so.”).

Throughout the trial, witnesses were unequivocal and consistent: nuclear power inhabits a uniquely fragile position. Mr. Muench stated: “[A]ny work that you do with nuclear fuel is the most sensitive and the most important kind of work that we do at Wolf Creek. . . . The most important thing we do is activities [sic] that protect the health and safety

of the public. And nuclear fuel is why we have that obligation.” Tr. at 905-06; see also Tr. at 906 (Muench) (describing rerack project “as very important relative to protecting the health and safety of the public”); Tr. at 939 (Muench) (“[Reracking] is a very sensitive project.”). Maintaining full-core reserve is “prudent,” Tr. at 1182-84 (Ferguson), as unforeseen problems and accidents can occur, see Tr. at 962-63 (Muench) (describing “frazil ice event” that shut-down Wolf Creek). In the mid-1990s Wolf Creek modified its management directives in order to require the preservation of full-core reserve, see Tr. at 1184-85 (Ferguson), and Mr. Ferguson conceded that “only in extreme circumstances . . . is [operating without full-core reserve] an option for [Wolf Creek] to consider,” Tr. at 1186. The court is convinced that Wolf Creek, like all nuclear utilities, carefully and deliberately makes decisions that can impact public safety. Saving “many millions of dollars,” see Tr. at 955 (Muench), is an insufficient incentive to compromise a well-founded directive—whether discretionary or mandatory—to maintain full-core reserve. For practical and prudential reasons, the court finds that Wolf Creek would not have forgone full-core reserve.

The court finds instead, that, beginning in spring 2005, Wolf Creek would have employed additional storage measures in order to maintain full-core reserve. Defendant’s final objection to the OFF model—that the acceptance of GTCC with SNF would have displaced Wolf Creek’s position on the OFF queue from 2006—is moot. Nonetheless, the court briefly entertains (and dismisses) defendant’s contention. The court notes that plaintiffs’ ability to model a “but-for” world is complicated by Yankee II, in which the Federal Circuit held that DOE would have accepted GTCC, as HLW, in conjunction with SNF. See Yankee II, 536 F.3d at 1278-79; Pac. Gas & Elec., 92 Fed. Cl. at 190 (“In light of [Yankee II], plaintiff’s argument that GTCC somehow does not fit within the acceptance queue is unavailing.”). In Yankee II the Federal Circuit noted that “[t]he proper valuation of GTCC waste disposal remains open for adjudication in future proceedings once the costs of this operation are fully realized and understood.” 536 F.3d at 1279. What remains to be “fully realized and understood,” however, is how plaintiffs are to apply the 1987 ACR—the prescribed acceptance rate for HLW along the OFF queue, see Pac. Gas. & Elec., 536 F.3d at 1292—even though GTCC is, in reality, low-level waste according to NRC regulations, see Tr. at 886-87 (Gelles). GTCC is measured “volumetrically,” in cubic meters, and not in metric tons of uranium, as is SNF, according to Christine Marie Gelles, DOE’s Director of the Office of Disposal Operations, Office of Environmental Management, who has been in charge of developing a GTCC waste disposal facility. Tr. at 849-50, 855(Gelles). Even DOE seems to be at a loss in evaluating how GTCC, as HLW, will integrate with SNF on the OFF queue. See Tr. at 822-23 (David K. Zabransky, Chief Operating Officer and Acting Principal

Deputy Director, DOE's Office of Civilian Radioactive Waste Management ("OCRWM")). 36/

The inherent difficulties in integrating SNF and GTCC do not prevent defendant from arguing that plaintiffs must "meet their burden to show how GTCC would have fit into the OFF queue, and that the inclusion of GTCC would not affect the year in which Wolf Creek received its first allocation." Def.'s Br. filed May 12, 2010, at 12 n.7. Mr. Zabransky allowed that the Standard Contract establishes a queue for SNF and HLW. See Tr. at 804; see also PX 70 at 5864 (prescribing collection rate for combined quantity of SNF and HLW). Still, the evidence adduced at trial establishes that GTCC, redefined by the Federal Circuit as HLW, would have had an insignificant impact on the OFF queue and would not have postponed DOE's first collection of spent fuel from Wolf Creek.

As of 2007, DOE estimated that commercial nuclear utilities had generated a very small quantity of GTCC: only fifty-eight cubic meters of waste, in total. See Tr. at 860 (Gelles); PX 196 at 0141 (DOE Notice of Intent To Prepare an Environmental Impact Statement for Disposal of Greater-Than-Class-C-Low-Level Radioactive Waste, 72 Fed. Reg. 40,135, 40,137 (2007)); PX 197 (72 Fed. Reg. 41,819, 41,819, correcting 72 Fed. Reg. 40,135, 40,137, and demonstrating fifty-eight cubic meters of GTCC waste); see also Tr. at 442-44 (Murphy) (converting GTCC into SNF-equivalent measurement with no effect on OFF model). Ms. Gelles, testifying as a party witness under Fed. R. Evid. 611(c) "st[ood] behind" DOE's estimating methodology, see Tr. at 865, 877-78. But see Tr. at 897-98 (Gelles) (conceding that the estimate might increase if process wastes are not blended). Thus, even if the court were to "carve out" a portion of the SNF acceptance rate to accommodate GTCC collection, the quantity of GTCC to be collected was sufficiently *de minimis* and would not have altered the OFF queue. Further, the Federal Circuit's consideration of GTCC as HLW for purposes of waste collection does not change the immutable nature of GTCC as low-level waste measured in cubic meters, not metric tons of uranium. The testimony of Mr. Zabransky and Ms. Gelles did not suggest that DOE necessarily would have "carved out" a discrete portion of an OFF allocation; instead, an easier and more likely method of acceptance might have been to accept GTCC as HLW, simultaneously with, but in addition to, spent fuel and other waste.

After post-trial briefing, defendant filed Defendant's Motion To File Notice on August 20, 2010, concerning its position on GTCC waste. Plaintiffs opposed on the reasonable ground that defendant was attempting to circumvent the inability of the parties

36/ Mr. Zabransky considers himself to be the most appropriate person at DOE to respond to questions on how DOE would integrate GTCC, as HLW, with SNF. See Tr. at 824 (Zabransky). He conceded that even he was in no position to help the court evaluate the status of this integration. See Tr. at 825.

to stipulate on point. The court granted defendant's motion by order entered on September 20, 2010. The Notice of the Government Regarding Greater Than Class C Rate, states, as follows:

For purposes of this case only, the Government will not contest that, in the "but for" world, acceptance of [GTCC] waste would not have affected the timing of the [DOE's] acceptance of Wolf Creek's spent fuel through 2008. The Government's position is based upon its assumption, made solely for purposes of this case and using the best data presently available, that GTCC waste enters the queue at the time that the GTCC waste is segmented or packaged.

Def.'s Br. filed Aug. 20, 2010, at 2.

2) The exchanges model

The evidence adduced at trial—primarily through the testimony of plaintiffs' fact witnesses—suggested that an alternative to the OFF scheme was necessary. Plaintiffs' first alternative to its OFF model is their exchanges model, according to which plaintiffs propose that Wolf Creek would have exchanged its 2006 OFF allocation with a cooperative partner holding an earlier position on the OFF queue. The Standard Contract afforded commercial nuclear utilities "the right to exchange approved delivery commitment schedules . . . for disposal of SNF and/or HLW . . ." JX 1 at 9747. Predicated on this allowance, plaintiffs' exchanges model presupposes the organic development of a national exchange market free of transaction costs. Because plaintiffs could not establish the realistic likelihood of this precondition, plaintiffs' OFF model fails.

The provision allowing exchanges was not in the original Standard Contract proposed by DOE. Loring E. Mills, a knowledgeable de facto expert on the lachrymose history of the nuclear fuel industry in the United States, see Tr. at 292 (explaining that President Carter "pulled the plug in April of '77"), represented Edison Electric Institute ("EEI"), a trade association for investor-owned electric utilities, when he offered comment on proposed provisions of the Standard Contract. See Tr. at 291-92, 304-07. He described the proposed contract as

a very rigid contract in trying to establish how spent fuel would be transferred from the utilities to the federal government. It did not provide what would be an efficient system that would accommodate variations within the utilities or the needs of the Department of Energy to achieve an efficient system.

Tr. at 312. Without exchanges,

[t]he alternative would be to transfer the spent fuel to the Department of Energy strictly on the basis of the allocation, which was oldest fuel first. And that was a very inefficient way to proceed with the program, because there was oldest fuel and then many different nuclear power plants, small quantities of oldest fuel. And it would involve a rather complex transportation program that was a much higher cost than would be achieved if exchanges were permitted.

Tr. at 326 (Mills).

Indeed, OFF likely would have been an inefficient model for both the nuclear utilities and DOE. See Tr. at 327-28 (Mills). Lake H. Barrett, who from 1993 until 2002 was Deputy Director of OCRWM and was not at DOE before the Standard Contract was published, criticized the practical consequences of an OFF-only system:

[W]hen you took all the 60-odd contract holders and divided up who discharged what fuel when in a mathematical [way], you ended up with numbers as a function of time based on how fast the DOE . . . total pickup rate was, 12,000 the first year, or second year, to 3,000, and you basically just allocated it in a mathematical algorithm. You ended up with oddball numbers, and you ended up with oddball times. Sometimes you have a very small amount. Sometimes a larger amount. You skip years, a lot of years. And it didn't make engineering sense from a transportation or loading [sense], which was the utility responsibility, to do these odd numbers that were mathematical algorithms on when you discharged fuel from your reactor 30 years ago.

Tr. at 1047.

To remedy the inefficiencies inherent in an OFF-based collection scheme, Mr. Mills and EEI proposed that DOE include an exchanges provision in the Standard Contract. Mr. Mills testified that EEI "believed it was necessary to allow this so-called exchange of allocations in order to run an efficient system and in order to accommodate the flexibility that was needed within the utility industry." Tr. at 312; see also PX 30 at 4128 (Mr. Mills's May 4, 1983 presentation to the Institute of Nuclear Materials Management, critiquing OFF and commenting on the importance of having "an allocation procedure that treats all purchasers on a reasonably equitable basis"). As suggested by the inclusion of the exchanges provision in the Standard Contract, DOE apparently recognized the value of exchanges. See JX 1 at 9747; see also PX 121 (September 28, 1995 letter from director of DOE's OCRWM to Yankee Atomic Electric Company, explaining that exchanges provision "was included in the Standard Contract in response to comments received during the Standard Contract rulemaking"). Mr. Zabransky's understanding was that DOE inserted the exchanges provision into the final draft of the Standard Contract "[s]o [utilities] could, between

themselves, subject to DOE's approval, work out the best way they wanted to change timing of their deliveries." Tr. at 750. He believed that DOE's position was to avoid the open management of SNF collections and, instead, to leave commercial nuclear utilities—the parties in the best position to optimize waste acceptance allocations—in charge of reallocating their capacities for acceptance, subject to DOE approval. See Tr. at 750-51.

It is clear that a cooperative spirit often motivates commercial nuclear utilities. Mr. Mills described uranium-enrichment exchanges, the approval of which was DOE's domain. See Tr. at 328-30. Mr. Muench emphasized the nuclear power industry's "long and very well known track record for collaboration and cooperation," Tr. at 945, and he noted his work as the chairman of a group formed by owners of utilities with pressurized water reactors, Tr. at 947-48. Terry J. Garrett, WCNO's Vice President of Engineering, has been responsible for Wolf Creek's involvement in nuclear-utility alliances and industry groups. See Tr. at 224-25 (Garrett). From 1999 until the end of 2004, he was Wolf Creek's representative to the Utilities Service Alliance ("USA"), an alliance of single operating utility stations, and the Strategic Teaming and Resource Sharing Alliances ("STARS"), a more recently formed group of seven similarly situated utility stations. See Tr. at 227-28, 230 (Garrett). In the USA alliance, approximately thirteen to fifteen utilities cooperate "to share resources, labor resources, tool and equipment resources, [and] take advantage of volume purchasing for goods and services" Tr. at 227-28 (Garrett). STARS permits similar collaboration. See Tr. at 227-28. Mr. Garrett suggested that USA and STARS contemplate that participating members work together as a "fleet operator," the benefits of which he described, as follows:

[A]s a single operator, we don't have the same advantages as a fleet operator which [has] multiple power plants. So what we attempt to do and are doing is we pool together with other members to this alliance to get volume discounts on large contracts for goods and services, share labor, share tools and equipment.

Tr. at 228. Wolf Creek has been a member of USA since the mid-1990s, and it assisted with the formation of STARS in early 2000. Tr. at 228, 230 (Garrett).

Mr. Garrett was an early proponent of industry-wide cooperative initiatives. He provided specific examples of Wolf Creek's cooperative agreements and intra-industry collaboration through USA and STARS: "[W]e established a tool sharing agreement, an equipment sharing agreement, a labor sharing agreement. We established a center of business for license renewals. We established a rad[-]waste disposal agreement, and a spare parts type of agreement for sharing spare parts." Tr. at 230-31. The rad-waste disposal agreement permitted utilities to engage in exchanges of a limited number of low-level waste disposal allocations available at the Barnwell waste disposal facility in South Carolina. See Tr. at 233-34 (Garrett). Still ongoing, the spare-parts agreement has expanded and

“probably” includes every nuclear-power utility in the United States; through an electronic database, members locate and purchase necessary spare parts at cost. See Tr. at 231-33 (Garrett). In light of these examples, Mr. Garrett agreed that nuclear-power stations attempt to resolve conflicts on a “win-win” basis, and he praised the exchanges provision:

[L]ike many of the agreements for cooperation and collaborative ideas that we’ve established in the past, this would have made sense. We had the need. It would have been a very comparable agreement that we established for the low-level rad[-]waste services agreement. Just it would have made a lot of sense to pursue that.

Tr. at 248-49.

Plaintiffs argue that, in a “but-for” world, utilities in such a cooperative industry would have embraced the use of waste-allocation exchanges. Mr. Mills believed that the Standard Contract’s exchanges would proceed more smoothly than did uranium-enrichment exchanges. See Tr. at 330. Although using a broker to negotiate exchanges was an option to be considered, Mr. Mills considered that a broker would have been unnecessary, as exchanges between utilities would have been “a fairly straightforward function.” Tr. at 337-38 (testifying that “most of these exchanges could be worked out between the utilities themselves”). Based on Wolf Creek’s participation in nuclear-industry alliances and cooperative agreements, Mr. Garrett confirmed that Wolf Creek would have participated in the Standard Contract’s exchange system and would have been “very successful” in its efforts to exchange delivery-commitment schedules. See Tr. at 248-50. If exchanges would have improved the timing of DOE’s collections and reduced costs, Mr. Muench was confident that Wolf Creek would have entertained the option. See Tr. at 944-45. Further, his thinking, based on “37 years working in the business and seeing [other] collaboration,” was that other utilities in the nuclear-power industry would have considered exchanges, as well. Tr. at 949 (Muench).

Plaintiffs also propose that the exchanges would have been popular with DOE. DOE had established a “DCS Information Network electronic bulletin board” to facilitate information sharing as a precursor to exchanges. See PX 120(1) (DCS Information Network User’s Manual); Tr. at 759 (Zabransky) (confirming that purpose of DCS Information Network was to facilitate exchanges among utilities). Mr. Mills testified as to notes summarizing a May 12, 1983 meeting of the EEI’s “Task Group on Waste Contract”—a meeting attended by representatives of nuclear utilities and DOE, during which the utilities’ representatives complained that DOE might withhold its approval of proposed exchanges. See PX 31 at 3201-02; Tr. at 334-36. Under the title “DOE approval of transfers,” the notes recorded: “DOE would not unnecessarily withhold approval for transfer of shipping ‘slots’ and that the provision in the contract was there for administrative purposes. DOE agreed,

however, that reasons to withhold approval could develop as experience with the transportation is gained.” PX 31 at 3202. Mr. Barrett’s perspective was that DOE viewed OFF as a necessary, but inefficient, administrative baseline, see Tr. at 1045-46, 1052, which would have been superceded by exchanges, see Tr. at 1057-59. He stated: “[I]f it was a legitimate exchange, it was always my understanding, and [the understanding of] all those that worked around me, . . . that we would approve such exchanges.” Tr. at 1059. He believed that any circumstances that would operate to invalidate a legitimate exchange—such as an exchange including incompatible fuel—would have been rare. See Tr. at 1059.

Mr. Barrett described a specific incident in 1993 in which Dr. Andrew C. Kadak, President and CEO of Yankee Atomic Electric Company (“Yankee”), petitioned DOE for an earlier OFF allocation to accommodate Yankee’s shut-down reactor. See Tr. at 1063-65 (explaining that Yankee wanted “to go to the front of line, the front of the queue”). DOE declined the request and informed Yankee that it should attempt to exchange its allocation position. See PX 103 (June 24, 1993 memorandum from Ronald A. Milner, Associate Director, DOE’s Office of Storage and Transportation, to Mr. Barrett, recommending denial of Yankee’s priority acceptance request because of its adverse impact on other utilities); Tr. at 1063-65 (Barrett) (testifying as to PX 103). On September 28, 1995, Daniel A. Dreyfus, DOE’s OCRWM Director, sent a letter to Dr. Kadak in which he advised, as follows:

[W]e continue to believe that once the Federal waste management system is operational, the exchange provision will be exercised by Purchasers as originally anticipated. Article V.E of the [Standard Contract] grants Purchasers the right to exchange with DOE concurrence, approved delivery commitment schedules. This provision was included in the Standard Contract in response to comments received during the Standard Contract rulemaking in order to allow Purchasers greater flexibility in managing their inventories of spent fuel. We believe the exchange provision will allow industry [sic] to optimize the allocation of waste acceptance capacity to meet individual utility needs, without overt involvement of [DOE].

PX 121. Mr. Zabransky agreed that this statement accurately reflected the DOE position regarding exchanges. See Tr. at 765.

The centerpiece of plaintiffs’ exchanges model was the testimony of Dr. Murphy. Dr. Murphy testified that Wolf Creek would have lost its full-core reserve in 2006, and he described the surplus discharges that would compromise full-core reserve as a “must-move”

quantity. 37/ Tr. at 421-28. He recognized, however, that low-burnup spent fuel might have complicated Wolf Creek's ability to maintain its full-core reserve, and he conceded that

if Wolf Creek were not able to use its full pool capacity, the issues under consideration here might advance its need to remove spent fuel by as much as one discharge cycle, which would move it from the fall of 2006 to the 2005 discharge, spring of 2005.

Tr. at 422; see also Tr. at 439 (Murphy) ("Wolf Creek would lose [full-core reserve] in spring 2005 if it had . . . a sufficient number of spaces unavailable."). Still, even if Wolf Creek's full-core reserve was compromised in 2005, he considered that exchange opportunities would have been readily available and costless by 2003, allowing Wolf Creek to dispatch its must-move waste without incurring additional storage costs. 38/ See Tr. at 475, 489-90 (Murphy).

To reach this conclusion Dr. Murphy analyzed the must-move needs of every plant in the domestic nuclear-power industry. See Tr. at 468-69 (Murphy). His analysis of the must-move needs of both operating plants and shut-down plants permitted Dr. Murphy to assess "the overall supply and demand for spent fuel removal rates." 39/ Tr. at 469. Dr.

37/ "Must-move" connotes the "economic need to remove spent fuel in order to avoid a storage cost which could otherwise be avoided." Tr. at 428 (Murphy).

38/ Defendant vigorously opposed Dr. Murphy's testimony as to the potential loss of full-core reserve in spring 2005, contending that Dr. Murphy always had predicated his exchanges model on the loss of full-core reserve in 2006—thereby discounting the low-burnup spent fuel problem—and had revised his opinion for the purposes of trial. See generally Tr. at 427-37. Nonetheless, Dr. Murphy concluded that Wolf Creek's must-move needs would not have resulted in additional storage costs, as "exchanges would have been easily available in the time frame, the 2005 time frame, when Wolf Creek might have needed exchanges. And those exchanges would have been costless by that time." Tr. at 423; see also Tr. at 464-65 (explaining that exchanges would have been an option to avoid storage costs if full-core reserve was lost in 2005). Given Dr. Murphy's opinion that a viable exchange market would have existed in 2003, Wolf Creek's loss of full-core reserve in spring 2005 is inconsequential to Dr. Murphy's opinion on the viability of exchanges. Cf. Tr. at 435-36 (Luke A.E. Pazicky, co-counsel for defendant).

39/ Operating plants, of which Wolf Creek is one, develop a must-move need as discharges accumulate and approach a specified storage capacity. Contrarily, for shut-down plants, the must-move need arises five years after the plant shuts down. See Tr. at 469-70 (Murphy) ("After a period of 5 years, during which the spent fuel would cool, the spent fuel is available for pickup by the [DOE]. And if that fuel is not removed at that point, then the

Murphy testified using a grid depicting the findings of his must-move analysis, color-coded according to operating plants and shut-down plants. See PX 251 at slide 14; Tr. at 470-71 (discussing slide 14). He used this data to graph the aggregate must-move quantity for both operating plants and shut-down plants. PX 251 at slide 15; Tr. at 472 (discussing slide 15). Comparing this aggregate must-move need to DOE's rate of waste acceptance set by the 1987 ACR, Dr. Murphy found that DOE's capacity for waste acceptance would surpass the utilities' aggregate must-move needs in no later than 2003. See PX 251 at slide 17; Tr. at 473-74 (discussing slide 17). Proceeding by OFF alone, however, utilities would inefficiently retain must-move waste while DOE accepted surplus waste that did not require immediate removal; Dr. Murphy characterized the DOE's acceptance of excess, non-must-move waste as "essentially misallocated acceptance in an economic sense." PX 251 at slide 20; Tr. at 474 (discussing slide 20); see also Tr. at 478-79 (discussing PX 251 at slide 23), 481-82 (comparing OFF inefficiency to hiring a moving company to move furniture according to an "oldest furniture first" scheme).

Exchanges would solve the inefficiency of the OFF-based system and would permit Wolf Creek to unload its surplus waste without incurring additional storage costs. Dr. Murphy purported to model DOE spent-fuel acceptance on the basis of economic priority, not OFF—i.e., spent fuel removal "is allocated first where it is needed"—thereby eliminating any "misallocated acceptance." Tr. at 474-75 ("And then only after all the spent fuel removal needs are satisfied is it actually allocated to spent fuel that doesn't actually need to be removed yet."); PX 251 at slide 22. Dr. Murphy found that, "by around 2003, the total supply of spent fuel removal exceeds the total demand for spent fuel removal and stays ahead thereafter." Tr. at 475 (discussing PX 251 at slide 22). Thus, by 2003 supply would exceed demand, reducing the cost of exchanges to zero. See PX 251 at slide 22; Tr. at 475-76. Wolf Creek did not require a solution to its surplus waste until 2005, at which point it would have lost full-core reserve; by 2005 a priority-based, exchanges-modeled acceptance system would have led to surplus supply, i.e., approximately 5,000 metric tons worth of acceptance rights, which could have accommodated Wolf Creek's must-move waste. See Tr. at 475-76 (discussing PX 251 at slide 22). Post 2003, with supply outpacing demand, exchanges made to capitalize on DOE's slack acceptance capacity could have been coordinated by the individual utilities and would have been regulated by "Adam Smith's invisible hand of the market." See Tr. at 477 (Murphy) ("Each actor acting in their own self-interest gets to the solution whereby we allocate the spent fuel acceptance rights where they are needed most.").

39/ (Cont'd from page 45.)

plant needs to continue to incur ongoing operating costs for the spent fuel in some other form of storage until acceptance occurs.").

According to Dr. Murphy, as compared to an OFF-based system, a need-based, “economically rational allocation” using exchanges would save approximately \$1.2 billion in storage costs, industry-wide, from 1998 until 2009. Tr. at 480 (discussing PX 251 at slide 23). The “reasonable economic allocation of acceptance” would prioritize the acceptance of must-move fuel with the highest storage costs and “leave[] unaccepted the must-move spent fuel that has the lowest cost of not being accepted.” Tr. at 482. Dr. Murphy used an “economic sequence model” in which he “calculate[d] year by year the economic priority of all the facilities that have a must-move need by that time.” Tr. at 483. A utility’s economic need to remove spent fuel equates to “dollars of cost savings, divided by the number of tons that you need to remove in order to achieve that savings.” Tr. at 483 (“[T]hose with the greatest economic need are the ones that have the highest avoidable cost divided by the amount of spent fuel that they need to remove in order to avoid that cost.”). A utility would carry a very high economic priority when the removal of a small amount of fuel would save a large cost. Tr. at 483. Potential cost savings would depend on the unique circumstances of each plant, so Dr. Murphy estimated the avoidable costs of every plant by using public data to estimate operating, maintenance, and storage costs attendant to waste storage facilities. See Tr. at 484-85. These costs would determine the price of exchanges prior to 2003; again, however, after 2003, a “crossover point” after which supply would outpace demand, the price of exchanges would fall to zero. See Tr. at 488; see also Tr. at 488-90 (describing expense of exchanges prior to 2003, with competition between buyers driving the price, and post-2003, with no remaining competition). Thus, according to Dr. Murphy, any uncertainty in his cost estimates would be meaningless after 2003. Tr. at 488.

Dr. Murphy explained that the vibrancy of his exchanges opinion meant that the identification of a specific exchange or exchange partner for Wolf Creek was unnecessary. Instead, he described “a very, very large number of potential combinations of exchanges,” particularly given the number of utilities willing to participate in a widespread, veritably costless exchange market. See Tr. at 492. He also found it unnecessary to identify a specific “mechanism” of exchanges; his opinion “doesn’t require exchanges [to] be bilateral transactions or be cleared through a centralized market or one of a broker or any of any other number of mechanisms for exchanging.” Tr. at 493. He analogized to other markets. The natural gas market, for example, assumes a variety of permutations, see Tr. at 493-94, with centralized and de-centralized markets, bilateral transactions, and “many different mechanisms . . . used in parallel,” Tr. at 496. Still, he predicted that “[t]he spent fuel exchanges market would actually have been a very simple market compared to many of the markets that utilities transact in on a daily basis. The number of potential counterparties is relatively small and known and fixed.” Tr. at 496-97. He described the absence of geographic constraints on the exchanges market and the lack of price volatility. See Tr. at 497. For Wolf Creek in particular, Dr. Murphy deduced that

the potential need for Wolf Creek to exchange if, for example, it were unable to use one discharge's worth of space in its pool, would amount to about one-half of 1 percent of the amount of slack in the program by 2005. So it is very small relative to the total amount of slack in the program. And that leads me to conclude that Wolf Creek would have no difficulty at all in . . . swapping for . . . any earlier needs it might have had in 2005.

Tr. at 499 (discussing PX 251 at slides 25, 26).

Dr. Murphy's analysis used data from DOE's June 1995 report, "Spent Fuel Storage Requirements 1994-2042," (the "1995 SFSR"), and he tested the "robustness" of his conclusions by performing "sensitivity analyses" that incorporated different data. See Tr. at 500-03. The 1995 SFSR included projections from 1993, which Dr. Murphy compared with the 2004 ACR/APR's actual discharge data from 1993 through 2003. See Tr. at 506. Dr. Murphy described a "sensitivity analysis" as a tool "simply designed to understand . . . the sensitivity of an analytical result to some of the inputs or assumptions that go into the analysis." Tr. at 502. By updating his information regarding early-shutdown plants and plants with extended operating periods, he found that the "crossover point" for supply to exceed demand might occur one year later, in 2004. See Tr. at 500-01. He ran "some pretty extreme sensitivities" regarding costs, both doubling and halving his original estimates, and found only a modest effect with no change to the 2003 "cross-over point." Tr. at 501. In sensitivity analyses designed to test the existence of accelerated demand, limited supply, or transaction costs, respectively, Dr. Murphy reached the same conclusion: Wolf Creek could have exchanged its allocation without cost prior to losing full-core reserve. Tr. at 502.

Defendant's surgically precise cross-examination of Dr. Murphy undercut the reliability of his opinions and revealed that his expertise regarding Wolf Creek did not include obtaining information from knowledgeable personnel at Wolf Creek, or even visiting the facility. Dr. Murphy attempted to deflect several of defendant's criticisms—namely, (1) his reliance on the 1995 SFSR data; (2) his incomplete knowledge of storage costs; (3) the potential for strategic pricing by sellers; (4) the "convenience costs" of non-need based exchanges; (5) the potential for DOE disapproval of exchanges; and (6) the potential for extraneous circumstances that might compromise a rational market. During trial the court partially granted defendant's objection under Fed. R. Evid. 702, disallowing the use of maximum-capacity data from the 1995 SFSR. That the court did not grant defendant's objection as to the entirety of Dr. Murphy's testimony does not signal that the remainder of defendant's criticism was unpersuasive. Defendant's analysis discredited Dr. Murphy's reliance upon inapposite data and familiarity with Wolf Creek's actual condition. The reliability of Dr. Murphy's sensitivity analyses also was impeached, as these corroborative exercises were predicated on similarly flawed data and methods. See Tr. at 661-71.

First, as determined at trial, Dr. Murphy's opinion was unreliable in that it depended on the 1995 SFSR data for the maximum storage capacity of nuclear-power facilities. The 1995 SFSR reports both a licensed capacity and a maximum capacity; maximum capacity can be larger or smaller than the licensed capacity. See Tr. at 517 (Murphy). Wolf Creek, for example, has a larger licensed capacity (1,340) than maximum capacity (1,327) on account of thirteen defective storage cells. See PX 116 at 2122 (1995 SFSR). Of the 123 plants listed in the 1995 SFSR, see id. at 2123, twenty-eight have a maximum capacity exceeding licensed capacity; these twenty-eight plants account for approximately 36,700 extra assemblies. See id. at 2119-22. DOE explained the variable capacities, as follows:

The stated maximum pool capacity given by the utility is used. If the maximum is greater than the licensed capacity, it is assumed that the maximum represents a new capacity that is technologically feasible and the utility will pursue a license amendment at some time to permit use of the additional capacity. If the maximum is less than the licensed capacity, there is usually some impediment that precludes use of that pool space and the maximum represents the serviceable capacity. The maximum storage capacities shown in this report may not be the ultimate maximum pool capacity. Many utilities . . . are conducting studies for expanding their storage capacities. For some reactor sites, the results of these studies may show greater pool capacities than those listed in this report as maximum pool capacities. These increased capacities will be incorporated when they are made known by the utilities.

Id. at 2099. Elsewhere the 1995 SFSR expressly predicates its maximum-capacity data on future additions to existing storage; the document's précis declares that “[t]hese estimates incorporate the maximum capacities within current and planned in-pool storage facilities . . .” Id. at 2085 (emphasis added).

Dr. Murphy justified his use of the utilities' maximum-capacity data by reasoning that DOE also used the maximum-capacity data to estimate a need for additional at-reactor storage. See Tr. at 518 (“I use the same measure that [DOE] relied upon. And I developed results that were consistent with their study.”); see also Tr. at 686-88 (providing impression of DOE intent for the 1995 SFSR). At the time of his rebuttal deposition on March 2, 2009, however, Dr. Murphy did not recall whether DOE had used the licensed or the maximum-capacity data. See Tr. at 589-90 (Murphy). He did not have an understanding of the steps to be taken by a utility in obtaining a license amendment or attaining a projected maximum capacity. See Tr. at 594-96. Dr. Murphy conceded that the costs of adding storage capacity as incorporated by the maximum-capacity data of the 1995 SFSR might be relevant to the cost of exchanges, see Tr. at 599, but these costs were not incorporated in his exchanges model, see Tr. at 611 (responding to questioning on select plants). For plants other than Wolf

Creek, he did not know whether low-burnup spent fuel or other physical characteristics would complicate the use of a projected maximum capacity. See Tr. at 615-21.

The court found during trial that any maximum-capacity data were unreliable on account of Dr. Murphy's assumption that "the maximum capacity, which was 1,327 for Wolf Creek, was also available and usable by all of the other players in the nuclear electrical industry." Tr. at 733. Accordingly, the court partially granted defendant's renewed objection under Fed. R. Evid. 702 and excluded these data. See Tr. at 734. Dr. Murphy claimed that one of his sensitivity analyses accounted for actual pool capacities that might conflict with the maximum-capacity projections from the 1995 SFSR. See Tr. at 679-81. Rather than supporting his opinion, however, Dr. Murphy's sensitivity analysis was a conjectural, abstract measure, detached from any reliable data or assumptions. See Tr. at 733-34. Dr. Murphy was not persuasive that he understood the potential limitations and costs that other utilities might experience in attaining the 1995 SFSR's maximum-capacity projections. In the absence of such a demonstration, he was unconvincing that a sensitivity analysis—through the manipulation of "supply" and "demand" variables—established the reliability of his opinion.

Aside from the projected maximum-capacity data, the 1995 SFSR data are inaccurate in their projection of certain utilities' full-core reserve. For Wolf Creek, for example, the 1995 SFSR data show the loss of full-core reserve in 2009, which Dr. Murphy incorporated into his analysis. See Tr. at 504, 625-26. Dr. Murphy's first retort to defendant's criticism was to describe Wolf Creek as "essentially the outlier here, one of the plants with the worst projection relative to its actual discharges." Tr. at 506; see also Tr. at 628-29. He contended that, although some actual discharge data deviated from the 1995 SFSR, the aggregate, industry-wide discharge data remained "pretty close" to the projections based on the 1995 SFSR. See Tr. at 505. He performed a limited juxtaposition—extending no further than 2002 because, for utilities other than Wolf Creek, he did not obtain actual post-2002 discharge data—of his model vis-à-vis actual discharge data. See Tr. at 629-30. He re-ran his must-move analysis on this actual data, finding that forty-nine utilities reached a must-move status during that period. See Tr. at 507 (noting, however, that Wolf Creek's must-move need arises after this period). Of these, thirty-five did not change from his original analysis; five shifted by one year; and nine shifted by two years. See Tr. at 507. Without an ability to show that the other utilities would not have suffered from low-burnup spent fuel, administratively blocked cells, or other impediments to using a maximum capacity, Dr. Murphy could not substantiate the reliability of these corroborative projections.

Dr. Murphy also demonstrated a limited knowledge of the storage costs incurred by utilities. See Tr. at 630-32. Indeed, he conceded some uncertainty in his data, see Tr. at 633, and agreed with defense counsel that, although costs are irrelevant to the DOE projections in the 1995 SFSR, they are critical to the must-move determinations underlying his

exchanges opinion, Tr. at 697-98. Regarding his own cost estimates, Dr. Murphy asserted that his analysis incorporated “all the available data” for the nuclear-utility industry; yet, only fourteen facilities had available data, and Dr. Murphy used the data from these fourteen facilities to estimate costs for four different categories of storage. See Tr. at 633. Of the fourteen facilities with available data, complete data for all four categories of costs were available from only three. See Tr. at 636. Dr. Murphy’s resultant estimates significantly vary from the estimates provided by the Brattle Group for the same categories during earlier SNF litigation. See Tr. 638-39 (“These differences are one of the things that lead me to say there is some uncertainty about the cost estimates that I use.”). Another difficulty with his methodology was that Dr. Murphy did not estimate or attempt to gather Wolf Creek’s particular storage costs. See Tr. at 639-40. But see Tr. at 691-92 (explaining that some of these estimates were not available and that some were irrelevant). He was not aware that Mr. Morris, for his December 1995 report, had prepared estimates of Wolf Creek’s potential costs for a dry fuel-storage plan. See Tr. at 676-77.

Dr. Murphy ventured to counter defendant’s criticism that sellers in the exchange market, i.e., those utilities holding a surplus allocation, might withhold their surplus allocation in order to manipulate the price of the exchange in their favor. See Tr. at 507-08. He maintained that such market-manipulation could occur only in “a relatively concentrated market or [when a] relatively small number of large suppliers control the supply.” Tr. at 408. Using standards applied by the Department of Justice to evaluate concentrated markets in the context of mergers and acquisitions, Dr. Murphy opined that the exchanges market “is well within the unconcentrated band.” Tr. at 509. Delving deeper, he attempted to isolate incentives to withhold supply by evaluating whether the largest supplier of allocation credits in any given year could influence the price of exchanges by withholding its allocation from the market. See Tr. at 510-11. He found that the amount of allocation credits that a utility would need to withhold in order to influence the market’s pricing would be so great that it would create a disincentive to attempt any manipulation. See Tr. at 511. He also doubted the ability of a “supplier” to charge a higher price to a potential “high[-]value buyer” because, in a unconcentrated market, another supplier with surplus allocation would undercut the higher price. See Tr. at 511-12.

Dr. Murphy speculated that Wolf Creek and other utilities might have exchanged their allocations based on “convenience” alone—that, in addition to a prototypical exchange based on avoiding spent-fuel storage costs, an exchange might be motivated by a utility’s desire to consolidate its OFF allocations into a smaller number of larger collections. See Tr. at 513, 646. He noted that, “[f]or all the buyers, earlier acceptance is at least as good or maybe better for many of them,” Tr. at 513, creating competition for acceptance rights during the first four or five years of the program, Tr. at 513. Still, he believed that utilities ultimately would coordinate and cooperate freely to accommodate preferences of convenience, as well. See Tr. at 514-17. He described how utilities coordinate their power-plan maintenance—in

some regions, “the system operator forces generators to coordinate with one another,” Tr. at 516—in order to avoid shutting down too many plants to perform maintenance during peak-demand periods, see Tr. at 515-17. Dr. Murphy, however, did not attempt to quantify these “convenience” costs for either Wolf Creek or any other utility. See Tr. at 651. He believed that, because exchanges would have been available freely, utilities would not be required to pay for convenience-motivated exchanges. See Tr. at 648-52. Thus, although during his deposition testimony he conceded that “I believe [Wolf Creek] probably would have been willing to pay some amount for exchanges,” Tr. at 649, he continued to insist that “there’s an important distinction between what Wolf Creek would have been willing to pay . . . and what it would have had to pay in a market environment,” Tr. at 650.

Dr. Murphy allowed that he “did not explicitly model the [DOE] approval of exchanges,” Tr. at 518, but “implicitly assum[ed] that exchanges would be approved [by DOE],” Tr. at 518 (“Really what I’m assuming is that disapprovals would not be so pervasive as to fundamentally change the resulting allocation.”). Some support for this assumption can be gathered from Messrs. Mills’s and Barrett’s testimony. Nonetheless, Dr. Murphy acknowledged that the Standard Contract does not impose upon DOE a good-faith obligation to approve all exchanges, and he could not attest to DOE’s intention to approve or disapprove of proposed exchanges. See Tr. at 658. He did not know whether DOE would disapprove of a proposed exchange due to logistical reasons; a proposed swap of dissimilar, incompatible assemblies; or a potential increase in DOE’s overall costs. See Tr. at 659-60. He claimed that, whatever the reason for disapproval, such disapproval would not have been so widespread or pervasive as to have impeded the exchange market. See Tr. at 693. Too many possible combinations of exchanges would have existed; further, DOE would have had to accommodate a “virtual” market of exchanges “where a single utility owns multiple nuclear plants and is allowed under the [Standard] contract to assign the OFF rights that derive from one plant to request fuel acceptance at a different plant.” Tr. at 692-93. Still, the May 12, 1983 meeting notes from the EEI’s Task Group on Waste Contract attest that even DOE projected that complicating circumstances might arise. See PX 31 at 3202 (“DOE agreed, however, that reasons to withhold approval could develop as experience with the transportation is gained.”).

Dr. Murphy also attempted to mollify the criticism that his analysis failed to consider the influence of factors other than the cost of storage, i.e., sociopolitical factors, risk aversion, and limitations on information. See Tr. at 520. On cross-examination Dr. Murphy acknowledged that he assumed that all utilities, as “rational actor[s],” would participate in exchanges in order to improve their relative economic positions. Tr. at 652-53. Dr. Murphy suggested that the influence of any of these extraneous factors necessarily would translate into an economic impulse in the form of the timing or quantity of either supply or demand. See Tr. at 521-22. He claimed that his sensitivity analyses adequately tested for variable supply and demand. Tr. at 521. As a consequence, although he did not model how any of

these individual factors would influence the utilities' decisionmaking, he opined that, "even if they were to have an impact, I don't believe they would be material, certainly not for Wolf Creek who, if it needed exchanges at all, would only need them in the period after there was substantial slack in the program." Tr. at 521-22. But his sensitivity analyses assumed the participation of all utilities. See Tr. at 653. His sensitivity analyses also attempted to model how sociopolitical considerations would affect supply or demand, but they did not model specifically any possible socioeconomic considerations. Tr. at 654 ("I did not model the sociopolitical process. I did, in some of my sensitivity analysis, model the economic impacts that a very extreme interpretation of some of those [sociopolitical] concerns might have had. . . . I did not develop a model of how people would have reacted to sociopolitical considerations and what those sociopolitical considerations would have been.").

Mr. Zabransky, another party witness called by plaintiffs, was an effective foil to Dr. Murphy, and his testimony persuaded the court that a readily available, costless exchanges market, in practice, would have faced greater obstacles than acknowledged by Dr. Murphy. In particular, a freewheeling exchange market would have been hindered by the utilities' gamesmanship and DOE's ability to disapprove of proposals. Mr. Zabransky testified that the exchanges provision would have allowed utilities to swap for earlier OFF-assigned allocations, see Tr. at 752, but he qualified his testimony by reiterating that readily available exchanges could exist only in a mature market, see Tr. at 753-54; see also Tr. at 757 (concurring with prior deposition testimony that "[u]ltimately, I believe that's the effect, yes, [exchanges] should work globally." (emphasis added)); Tr. at 795-96 (testifying that "it took the 70's and 80's" for the nuclear fuel market to develop). But see PX 121 (OCRWM's letter advising Yankee in the mid-1990s, to pursue exchanges); Pls.' Br. filed July 16, 2010, at 3 ("[G]iven that DOE would have started receiving delivery commitment schedules . . . from utilities 63 months prior to 1998 and Wolf Creek would not have needed acceptance until 2005, [Mr. Zabransky's] caveat [that exchanges could not exist "in the first few years," Tr. at 789,] is not material to Wolf Creek's situation." (citing Tr. at 779-80)). Proposed exchanges would not have been seamless: any proposed exchange would have to account for the planning and training required for an SNF collection. See Tr. at 780-82 (explaining submission of DCS forms sixty-three months prior to collection, including twelve-month window for setting final delivery schedule).

Mr. Zabransky also explained that DOE would have retained and likely would have exercised its sole discretion to disapprove of exchanges when proposed waste combinations were incompatible or when logistical issues or political pressure complicated the proposed exchange. See Tr. at 776-78, 786-88. He believed that a utility would not exchange its priority acceptance for free. See Tr. at 785-86. Competitive pricing had complicated the nuclear fuel market, which Mr. Zabransky described as similar to the proposed exchanges market for SNF collection allocations. See Tr. at 792-95. Thus, although some utilities might have considered exchanging an allocation without cost, the smaller utility at which Mr.

Zabransky worked would have expected payment. See Tr. at 785-86 (“[I]f anybody was going to give it to somebody else, it was going to be for us to do and not for free.”).

Dr. John W. Bartlett, former Director of OCRWM, testified by transcript of his 2006 testimony in Pacific Gas & Elec. Co. v. United States, 73 Fed. Cl. 333, 406-08 (2006), aff’d in part, rev’d in part, and remanded, 536 F.3d 1282 (Fed. Cir. 2008) (“Pacific Gas I”). See generally, PX 245 (Transcript of Proceedings, Pacific Gas I, No. 04-74C (Fed. Cl. June 6, 2006)); Order, Kansas Gas & Elec. Co., et al. v. United States, No. 04-99C (Fed. Cl. Apr. 19, 2010), ECF No. 81 (granting plaintiffs’ consent motion to designate Dr. Bartlett’s prior testimony transcript in lieu of live testimony); Order, Kansas Gas & Elec. Co., et al. v. United States, No. 04-99C (Fed. Cl. May 21, 2010), ECF No. 106 (setting guidelines for introducing Dr. Bartlett’s testimony at trial). The court read the parties’ designations and exhibits, which were admitted into the record of the instant case, see Tr. at 842-48, as well as the discussion of that testimony on the issue of exchanges found in the opinion published at 73 Fed. Cl. at 413 (“Although some individuals testified at trial that Pacific Gas I generally would have sought to use exchanges had DOE performed the Standard Contract. . . .”). His testimony on point was not persuasive to that judge on the first round, see id., and the remand opinion does not discuss it, see 92 Fed. Cl. 175. Dr. Bartlett’s enthusiasm for exchanges was dimmed during his cross-examination, and the court finds Mr. Zabransky to be the more credible witness who was able to testify as to the entire context for considering the feasibility of exchanges, given the contract provisions, regulatory restraints, and costs that could not be assumed away.

Defendant’s post-trial briefing emphasizes the extent to which Dr. Murphy predicated his exchanges analysis on the maximum-capacity data supplied by the 1995 SFSR. See Def.’s Br. filed July 16, 2010, at 21-22 (citing Tr. at 588-89, 611-13, 666 (Murphy)). Dr. Murphy acknowledged that a different measure of capacity could change the quantity of must-move waste and affect both the demand and cost of exchanges. See Tr. at 611-12. Dr. Murphy prepared his exchanges opinion in the abstract, without any input from key personnel at Wolf Creek. Prior to writing his expert report, Dr. Murphy did not discuss the topic of exchanges with anyone from Wolf Creek. See Tr. at 674-75 (admitting specifically that he did not discuss exchanges with Messrs. Muench, Morris, or Ferguson). He did not ask anyone from Wolf Creek about Wolf Creek’s particular incentives to participate in exchanges, see Tr. at 675, nor had he seen any documentation indicating that Wolf Creek would have participated in exchanges, see Tr. at 676. This revelation illustrates the inherent flaw that attaches to Dr. Murphy’s opinion: although it appears to satisfy an economist’s desire for a model of a rational market, it is unmoored from the specific factual underpinnings of Wolf Creek’s claim and is an unreliable depiction of a “but-for” world.

3) Plaintiffs' fallbacks

Plaintiffs' opening post-trial brief concedes that "a significant question is how Wolf Creek would have addressed its low[-]burnup spent fuel in the nonbreach world." Pls.' Br. filed July 16, 2010, at 2 ("Wolf Creek would have had a number of options available to it to manage its spent fuel storage situation in this nonbreach world."). Aside from exchanges, plaintiffs presented three fallback positions: the soluble boron fallback, the RCCA fallback, and the rack-savers fallback. See id. at 5, 8. According to Mr. Ferguson, the 1995 SFSO treated low-burnup spent fuel as a footnote because, with several remedial options available, low-burnup spent fuel was "almost a nonsignificant issue for the purposes of analyzing our spent fuel storage options and needs in the future." Tr. at 1175-76. Defendant contends that plaintiffs "left the Court with impressionistic cost estimates regarding unproven methods for dealing with their low burn-up fuel [i.e., the soluble boron fallback and the RCCA fallback], and no cost estimate for a third, more proven method of storage [the rack-savers fallback]." Def.'s Br. filed July 16, 2010, at 23; see also id. at 18 ("Yet, as hard as [plaintiffs] tried to get in their back[-]door cost estimates for the RCCA insertion and soluble boron methods, they made no effort to explain how much it would have cost to use poison inserts or Racksavers." (citing Tr. at 1227-30 (Ferguson)).

Plaintiffs' fact witness testified that RCCA inserts would have resolved Wolf Creek's problems with low-burnup spent fuel. See Tr. at 121 (Morris); Tr. at 907-09, 915 (Muench); Tr. at 1153-54 (Ferguson). Wolf Creek had 108 RCCAs available in its pool, see Tr. at 124 (Morris); these would have emitted a "neutron poison," Tr. at 116 (Morris), enabling low-burnup assemblies to qualify for region 2 storage, see Tr. at 1153-54 (Ferguson). Defendant decries the insufficiency of plaintiffs' cost estimates for this fallback. Mr. Muench testified that it would have been a straightforward plan, and he summarily concluded that, "based on the many years of experience I had at doing this kind of work, that kind of analysis and review in my opinion would have been less than a hundred thousand dollars." Tr. at 917; see also Tr. at 923 (Muench) ("[I]n my role as vice president of engineering and also in my Westinghouse days and so forth, I've seen many estimates for . . . this type of work, . . . in the budget setting process and in the purchasing process."). But see Tr. at 987-88, 1031 (noting that Mr. Morris knew little of licensing process). Mr. Ferguson provided a lower estimate, stating that Wolf Creek could have analyzed and licensed the process for less than \$75,000.00. See Tr. at 1165, 1233; see also Tr. at 1156, 1159 (Ferguson) (providing background cost estimates of other analyses). He acknowledged, however, that he estimated the costs of only the analysis and licensing and that he did not consider other potential inputs like labor, hardware, or overhead. See Tr. at 1234-35 (Ferguson). Although plaintiffs' counsel allowed that an additional expense might have been incurred in moving the RCCAs into the low-burnup assemblies, even with these costs and overheads added to the tally, the court was "obviously looking at a total cost of somewhere in the neighborhood of \$100,000." See Tr. at 2009 (Shapiro).

Defendant also argues that plaintiffs have “no proof that this method would have been viable at Wolf Creek” Def.’s Br. filed July 16, 2010, at 15. Mr. Ferguson testified that Wolf Creek would have performed a criticality analysis in order to obtain a required license from the NRC, and he suggested that Wolf Creek previously had performed and received credit for similar analyses. See Tr. at 1154-56. Mr. Morris agreed that an NRC license would have been required to take credit for the RCCAs, but he conceded that Wolf Creek had not pursued this license. See Tr. at 197 (Morris). In fact, the NRC had never approved this type of license, and Mr. Morris did not know if the NRC would have approved Wolf Creek’s request. See Tr. at 198, 200. The NRC might have denied the request. See Tr. at 200. Nonetheless, plaintiffs proffer that RCCAs were a viable option because Millstone and Northeast Utilities, different nuclear utilities, had received a license for a similar measure, i.e., using borated stainless steel rods in its assemblies. See Tr. at 116; see also Tr. at 198 (“It’s very similar to the borated stainless steel mechanism used by Northeast Utilities. So we believed it was a possibility.”). Defendant’s cross-examination of Mr. Morris endeavored to show that using borated stainless rods was entirely different than using RCCAs. See Tr. at 199.

Plaintiffs’ rack-savers fallback is the least convincing of the three. Plaintiffs’ counsel conceded during closing argument that plaintiffs had “more information available about what the costs would have been for implementing [the RCCA fallback or the soluble boron fallback.]” Tr. at 2007 (Shapiro). Siemens Power Corporation had developed rack savers “that [were] impregnated with boron, a neutron poison material” which, when physically attached to a fuel assembly, “would change [the assembly’s] effective reactivity to improve its conditions for storage in a . . . region 2 storage.” See Tr. at 1174-75 (Ferguson); see also Tr. at 1227-28 (describing rack savers as “a type of poison material . . . that’s inserted into a fuel assembly. So it is one of the options I thought was possible for the low burnup storage.”). Wolf Creek had considered rack savers as part of Mr. Morris’s 1995 SFSO, and the NRC had approved the use of similar inserts at other facilities. See JX 3 at 37-38; Tr. at 1216-20 (Ferguson). However, Wolf Creek never obtained a price quote from Siemens Power Corporation for the rack-savers, and plaintiffs were not able to estimate the costs of this fallback. See Tr. at 1230-31 (Ferguson) (acknowledging that additional material, at additional cost, was required). Without evidence of the viability of this option or its cost, the court cannot find that the rack-savers fallback would have been the solution in the “but-for” world.

During closing argument plaintiffs’ counsel argued that, were the RCCA fallback disfavored, less uncertainty was attached to the soluble boron fallback. See Tr. at 2007. Soluble boron was present in Wolf Creek’s spent-fuel pool, and, like the RCCAs, it provided a poison that might mitigate the low-burnup fuel problems. See Tr. at 1166 (Ferguson); Tr. at 124-25 (Morris). The Wolf Creek SFSO had analyzed the possibility of seeking a soluble boron credit in the context of increasing in-pool SNF storage, see JX 3 at 9211, 9239-40, and

Mr. Ferguson testified that the NRC had permitted other utilities to use a soluble boron credit for criticality purposes, see Tr. at 1166-67; see also Tr. at 124-25 (Morris). But see Tr. at 206-07 (Morris) (acknowledging that at time of his deposition he did not know if NRC allowed credit for soluble boron as a tool for low-burnup fuel). Mr. Ferguson believed that, with a similar criticality analysis and approval, soluble-boron credits would permit Wolf Creek to address its low-burnup spent fuel, see Tr. at 1167, at a cost similar to that presented by the RCCA fallback, Tr. at 1173-74. The analysis of Wolf Creek's engineering department in the 1995 SFSO overall suggests that soluble boron might not have remedied the low-burnup fuel problem. See JX 3 at 9239. According to the 1995 SFSO, even with a soluble boron credit, a Region 1 and Region 2 division likely would remain and would experience little change. See id.; see also Tr. at 207-09 (Morris) (acknowledging, that for purposes of 1995 SFSO, soluble boron might have little effect on Region 1 and Region 2 storage). But see Tr. at 209 (discussing JX 3 at 9239 and stating that 1995 SFSO discussion of soluble boron was to determine "can we do four out of four storage throughout the whole pool, and not for the purposes of relaxing burnup restrictions in Region 2," and agreeing that report's discussion of soluble boron "was done for an entirely different purpose than for dealing with low[-]burnup fuel"). The court finds that Wolf Creek most likely would have pursued the soluble boron option in the "but-for" world, although plaintiffs offered no estimates for its costs.

IV. Damages

1. Rerack project costs—direct costs

Wolf Creek paid Holtec \$8,703,042.00 for the rerack project, which included all costs relating to removal of hazardous wastes. Factual Stipulations ¶ 21; Tr. at 1505 (Robke). Wolf Creek incurred \$599,573.57 in direct labor costs due to the installation of the new racks. Factual Stipulations ¶ 22. This latter amount excludes direct labor costs for the study undertaken by Messrs. Morris and Ferguson that was not directly billed under the rerack project number. Id. The NRC billed \$100,350.70 for its review of the rerack project. Id. ¶24.

Plaintiffs also claimed \$338,166.03 for material and subcontract charges in excess of the amounts paid to Holtec; \$1,755.00 for meals; and \$52,459.48 for time that Messrs. Morris and Ferguson did not bill directly to the project, but estimated for purposes of this litigation that they had spent on studying alternatives, including the rerack project. See PX 250.

Mr. Robke, the KGE accountant, as Supervisor of Asset and Compliance Accounting, was part of a group tasked with oversight for cost accounting on all major capital projects, including the rerack project at Wolf Creek during the period 1997-2001. See Tr. at 1370-73 (Robke). He presented the additional damages items directly billed to the rerack project: for

materials and subcontractor charges, meals, the Morris and Ferguson costs, and the NRC review. See Tr. at 1381, 1410-15, 1504-05 (Robke). He testified that meals were charged at \$15.00 per meal for employees held over on overtime, Tr. at 1413; that Wolf Creek's own warehouse materials were used on site, Tr. at 1380-81; and that off-site employees or "extra engineers" ("subcontractors"), Tr. at 1381, 1414 (noting that subcontract costs account for subcontractor labor on rerack project, not materials), were utilized.

The court accepts Mr. Robke's testimony that the costs for meals were incurred for the rerack. The court also accepts Mr. Robke's testimony that the claimed direct costs figures "were all extracted from [Wolf Creek's] financial system using the project numbers for the rerack job." Tr. at 1413. This cost code system captured the \$599,573.57 in direct labor charges stipulated to by defendant. See Tr. at 1413-14 (Robke); Factual Stipulations ¶ 22. The court also credits Mr. Robke's testimony that the cost code system captured the remaining \$338,166.03 in extra materials charges and subcontracts in excess of the amounts paid to Holtec. See Tr. at 1413 (explaining that amount claimed as material charges in PX 250 includes "some incidental material that we used out of our warehouse, and also any . . . materials and supplies that we would have got [sic] from a third-party supplier"). Last, in addition to labor charges, defendant stipulated to the cost of the NRC review. Factual Stipulations ¶ 24. Therefore, the court awards plaintiffs their claimed direct costs for labor charges, meals, material charges, subcontracts, and the NRC review. See PX 250.

The court found Messrs. Morris and Ferguson adequately to have accounted for their gross time in performing their preliminary study for storage options, including the rerack project. See Tr. at 136 (Morris); Tr. at 1178-79 (Ferguson). In 2009 Mr. Robke calculated the costs for their time before a project number began to capture their time on the rerack project in 1997. See Tr. at 1410-11, 1415-22, 1500; PX 225. Because no effort was made to apportion this time to the rerack alternatives, the court disallows the additional Morris and Ferguson labor. See PX 250; Tr. at 1502 (Robke).

The parties agree on major items of damages, and the court appreciates their efforts to stipulate to some legal and more factual issues. However, plaintiffs' case, while presenting an *ad damnum* that is comparatively modest in the SNF-huge-awards pantheon, did not prove that plaintiffs would not have incurred mitigation costs. Defendant resists any obligation to prove up the mitigation costs that plaintiffs would have incurred in the "but-for" world that should be deducted from the undisputed mitigation costs incurred by plaintiffs in reracking and the other items that the court awards. In brief recapitulation, plaintiffs were charged with the burden of constructing a reasonable "but-for" scenario to ensure that the Government would not be charged for any costs that plaintiffs reasonably would have incurred to keep Wolf Creek operating at full-core reserve—Wolf Creek's operating policy—had DOE performed under the contract. Plaintiffs offered four scenarios, backed by rough approximations of costs from Messrs. Morris and Ferguson. The court found two

to be unlikely; one to have been likely, but for which no damages were estimated; and one to fail for lack of proof. In its initial post-trial brief, defendant explains the court's dilemma:

Ultimately, plaintiffs' failure of proof infected [their] damages claim in multiple ways. First it caused them [to] be unable to properly account for the costs they would have been required to expend to make use of the full capacity of their spent fuel pool. It also left them with no proof as to the difference between their overhead expenditures in the actual and "but-for" worlds. . . .

....

In the end, the plaintiffs have put the Court in a difficult position through their own deliberate litigation strategy. They have left the Court with impressionistic cost estimates regarding unproven methods for dealing with their low burn-up fuel, and no cost estimate for a third, more proven, method of storage. The Court as the finder of fact has the discretion to weigh plaintiffs' evidence and to decide whether to reject, discount, or do something else with it. Even if the Court is not inclined to reject their evidence altogether and find that plaintiffs have failed to meet their burden, the Court should in its fact-finding role use the \$75,000–\$100,000 offered by plaintiffs' witnesses as a mere starting point from which to arrive at a more credible estimation as to the cost involved in dealing with low burn-up fuel. This is particularly appropriate where plaintiffs' witnesses have acknowledged that the poison insert method, the most credible method, would have been more expensive.

Def.'s Br. filed July 16, 2010, at 2, 23.

The Government breached the Standard Contract and placed plaintiffs in the position of having to prove a unique "but-for" damages scenario. Given the direct costs incurred by plaintiffs for the Holtec rerack, what costs would plaintiffs have incurred that were not related to the project but would have been incurred to address capacity issues absent the Government's breach of contract? Most SNF cases involve disputed charges that the utility argues were incurred due to the breach. Here, plaintiffs had to hypothesize charges that would have been incurred without the rerack project, thereby proving the net financial effect of DOE's breach.

It may be unprecedented that the Government invites the court to enter a component of a damages award that is built on an estimate for which defendant deems proof insufficient. As discussed with defense counsel in closing argument, the parties' agreement that the direct costs of reracking were over \$9.4 million, coupled with defendant's resistance to proving its

version of what portion of that amount represented Wolf Creek's avoided costs (defendant contending throughout that binding precedent put that burden on plaintiffs and that any uncertainty in the proofs for which they were responsible must not inure to their benefit), means that the record contains minimal evidence to support deductions for costs that plaintiffs would have incurred in the "but-for" world. See Tr. at 2072-75. A "take it or leave it" approach tends to abuse principles of fairness and equity. In a similar circumstance, the Federal Circuit has imparted guidance:

Both sides thus continue to take an all-or-nothing approach on appeal. The government argues that the plaintiffs should receive no damages because they have not proved the costs they would have incurred absent a breach, while the plaintiffs contend that they are entitled to the full value of the equity interest relinquished as part of the EBA [Economic Benefits Agreement] because they would not have relinquished equity absent a breach and thus the EBA-related costs they would have incurred absent a breach are zero.

We do not accept either of those extreme positions.

Bluebonnet V, 339 F.3d at 1345.

The court will not penalize defendant for plaintiffs' failures of proof, but will not build on the "back-of-the-envelope" analysis of plaintiffs' witnesses as defendant would encourage the court to do. Tr. at 2073, 2075 (Carney). Therefore, the court utilizes the highest estimate offered by plaintiffs' witnesses for one of the two alternatives that carried an estimate, \$100,000.00. Had plaintiffs not utilized one of these alternatives, Mr. Muench testified that plaintiffs would have spent "under" \$100,000.00 to perform the gate-drop analysis discussed by Mr. Morris. See Tr. at 186-87 (Morris); Tr. at 926 (Muench).

Plaintiffs' recoverable direct costs total \$9,742,887.30 (\$599,573.57 in stipulated labor charges, plus \$8,703,042.00 in stipulated Holtec charges, plus \$1,755.00 in meals, plus \$338,166.03 in materials and subcontract costs in excess of the stipulated Holtec charges, plus \$100,350.70 in stipulated NRC review costs), less \$100,000.00 in costs that they minimally would have incurred but for the breach for an alternative or for the gate-drop analysis, which yields \$9,642,887.30 as plaintiffs' total direct costs award.

2. Overhead costs

1) General

Plaintiffs seek \$3,842,128.64 in overhead costs attributable to Wolf Creek's mitigation efforts. PX 250. Plaintiffs divide overhead costs into three constituent elements:

labor overheads (\$160,467.99), material overheads (\$260,725.47), and construction overheads (\$3,420,935.18). See id.; Tr. at 1382 (Robke). The parties have stipulated to \$160,467.99 in claimed labor overheads. Factual Stipulations ¶ 23. Therefore, because only material overheads and construction overheads remain in dispute, the court limits its analysis to these two claims.

2) Accounting practices

Wolf Creek's financial services department accounts for the cost of its capital projects according to the Federal Energy Regulatory Commission ("FERC") guidelines. FERC provides "guidance on what to consider a capital project versus a normal operations project," and it sets forth amounts that can be directly charged to a project or charged to the applicable overhead accounts "to be allocated to all projects and costs." Tr. at 1375 (Robke). The rerack project was a capital project. Tr. at 1374 (Robke). Each capital project was given a project number to track costs. Tr. at 1376-77 (Robke). Mr. Robke described how costs are tracked:

There's several sources that [costs] would come in through, whether an invoice from a contract or material from our warehouse or a time sheet . . . through our payroll system. Those are all entered . . . in various methods through our accounting system with the project number and appropriate codes to capital . . . to assign itself to that project, by using that project number.

Tr. at 1377. The costs are broken down and allocated into various categories, such as direct charges for labor and materials. See Tr. at 1377-78; see also PX 250.

3) Categories of overhead

(1) Material overheads

Plaintiffs' claim for material overheads represents overhead for Wolf Creek's warehousing, material acquisitions, and transport costs. Tr. at 1401 (Robke). These include labor costs from its warehouse group, costs for contract support and materials and supplies, freight and expediting costs, documentation charges, and labor overheads on indirect (warehouse) labor. 40/ Tr. at 1401; PX 250. Together these indirect costs are allocated to

40/ "Contract support is when Wolf Creek would hire a non-Wolf Creek employee to come in and help run the warehouse functions, maybe during an outage or something like that, where the workload is high, they would bring in a couple of extra folks to help do their normal processing." Tr. at 1403 (Robke). The category materials and supplies "refers to incidental materials that are used to run the warehouse . . . on an ongoing basis." Tr. at 1403.

Wolf Creek's material overhead pool. The material overhead pool is comprised of a purchasing group that drafts the contracts and materials purchase orders, the warehouse group that physically handles materials in the warehouse, and a material engineering group that inspects materials before they are used. Tr. at 1402.

Wolf Creek applies code L40 to track its material overhead allocations in its accounting system. Tr. at 1401. Mr. Robke explained why material overheads are allocated separately from construction overheads:

Warehouse, their function is to prepare for, receive, get all material[s] ready to use by the Wolf Creek site, but they do not bill directly to capital projects. And so they would charge to an indirect pool to be allocated to all, . . . not just capital projects, but operations projects as well.

Tr. at 1401. The material overhead rate is calculated annually using a total-cost allocation method. 41/ This system is identical to the total-cost allocation method used for construction overheads, discussed below, except that material overheads are capped at \$250,000.00. See Tr. at 1406. Because the material overhead pool includes both capital material and

40/ (Cont'd from page 61.)

Freight and expediting charges include the "cost to get the material from the vendor to the site," and are capped at \$2,500.00 with any excess thereafter billed directly to the project. Tr. at 1404. Documentation charges cover the documents associated with off-site materials brought in for use in the fuel pools. Tr. at 1404 ("[O]ur vendors will have to supply documentation that this is the right material type, things of that nature, that sometimes they bill us extra for. And those are charged to the overhead pool as well.").

41/ Mr. Robke explained how the material overhead rate is derived from the total cost allocation method:

All those components that we just discussed are budgeted components, and those would be collected, tallied, and then we would have our total available to allocate from this material overhead pool. We would look at budgeted construction for the coming year, as well as operations material for the coming year. We would . . . get the total material to allocate to, and then would take the total available to allocate divided by the budgeted material for both operations and capital and come up with the rate, similar to what we do with . . . construction overheads.

Tr. at 1405.

operations material, the costs are capped “to prevent overallocation to one particular project.” Tr. at 1406 (Robke). This accounting method has been used since 1987. Tr. at 1408.

(2) Construction overheads

“Construction overheads represent indirect labor from support groups, capitalized administrative costs, and also the labor overheads on indirect labor” Tr. at 1386 (Robke). Wolf Creek allocates construction overheads to capital projects because construction overheads represent “actual costs that Wolf Creek has for groups that don’t . . . normally charge directly to projects.” Tr. at 1386 (Robke). Human Resources is an example of a group that provides indirect support to a capital project but does not directly bill to that project. See Tr. at 1386-87 (“[Human Resources] were not directly working on the capital project, but they have to do training to get all of our contractors on site. They perform that training two or three days, normally, to get a person ready to . . . work at a nuclear site, things like that.”).

Wolf Creek calculates its annual construction overhead rates using a total-cost allocation methodology: Wolf Creek develops its “available to allocate pool,” i.e., its planned-total-construction overhead pool, by calculating the total costs of its planned capital projects for the year, then dividing the available-to-allocate pool by the total capital budget, which yields a percentage rate (the construction overhead rate). Tr. at 1398 (Robke) (explaining that, “if our available to allocate is 5 million and our construction budget is 20 million, that would leave us with a . . . 25 percent rate”). The total cost of a capital project includes payments to outside contractors. Tr. at 1666-67 (R. Larry Johnson, defendant’s expert in analysis of economic damages). On the rerack project, payments to Holtec for the material costs of the racks were included. The construction overhead rate then is allocated to each capital project charge. Tr. at 1398-99 (“When any of the direct costs or . . . any of the costs, period, come in to the project . . . a dollar amount was allocated based on that percentage to each of those costs that are charged to that project on a monthly basis.”). 42/ The largest capital projects receive the largest share of the overhead pool allocations, while smaller capital projects receive smaller allocations.

While the rate is calculated on an annual basis, Wolf Creek’s finance department continually compared the available-to-allocate pool against actual expenditures on direct costs, and the rate was subject to change to account for any discrepancies. Tr. at 1399

42/ Plaintiffs explained that the total-cost method for construction overheads differed from material overheads in that “material overhead costs are calculated based on the plant’s total material costs for the year, as opposed to the plant’s total construction budget for the year, and are allocated based on the total cost of a project’s materials, as opposed to the total cost of the project.” Pls.’ Br. filed July 16, 2010, at 21 (citing Tr. at 1405-07 (Robke)).

(Robke) (explaining that they reviewed figures “on an ongoing basis, sometimes monthly, but at least quarterly”). Wolf Creek also has employed the total-cost allocation methodology since 1987. Tr. at 1400. This methodology was used to calculate the overhead rates for the rerack project. Tr. at 1400. The same annual rate is not employed each year for construction overheads because the “list of capital projects fluctuates from year to year,” along with the “overheads that are available to allocate.” Tr. at 1399. However, the rerack project was the only significant capital project at Wolf Creek from 1997 through 2001.

Wolf Creek divides its construction overhead pool into three groups: indirect labor from support groups, capitalized administrative costs, and labor overheads on indirect labor. Tr. at 1386 (Robke); PX 250. The sum of the costs associated with these groups constitutes Wolf Creek’s construction overheads.

(i) Indirect labor

Wolf Creek’s capital projects received support directly from employees who were assigned specifically to a project team, as well as from employees who were not assigned to a project but provided indirect support or supervision. Tr. at 1380 (Robke). Wolf Creek charged its direct labor costs—the time that its employees, who were assigned to a capital project team, spent on the project, including the rerack project—directly to the project, not to an overhead account. See Tr. at 1379-80, 1390-95, 1437, 1471; DX 31 at 3245 (e-mail explaining Wolf Creek tracked hours spent on rerack project). By contrast, indirect labor was charged to its construction overhead pool. Indirect labor is “the cost of support groups [or departments] that . . . are charged to capital projects . . . based on a review of each of the groups throughout the site.” Tr. at 1387 (Robke). A listing of direct labor billings for the rerack project shows a small number of employees who directly bill to the project and a larger portion of Wolf Creek employees who do not directly bill but provide support. PX 224; see also Tr. at 1287-99 (Holloway) (discussing PX 224).

To calculate its indirect labor capital overheads, Wolf Creek “splits” each department’s time between capital projects and operations. Tr. at 1387-89 (Robke) (“Back in the early '90s, we had done a . . . study of all the [departments] to determine how much of their work was towards capital projects and how much was normal operations. And those percentages are reviewed annually at budget time to make sure there’s no specific changes that needed [sic] to be made. And those costs are accumulated in an indirect labor pool to be allocated over all capital projects.”); see, e.g., PX 239 at 8963 (1992 manpower report showing Wolf Creek’s president and CEO’s time split between capital project (six percent) and operations (ninety-four percent)); Tr. at 1389 (explaining that, with respect to construction overhead pool for Wolf Creek’s president, six percent represents allocation of “the amount of time that . . . the accounting group has identified as being chargeable to capital projects” because “[h]is oversight of capital jobs is one of his functions”).

The indirect labor rate is set prospectively during Wolf Creek's annual budget review. See Tr. at 1388 (explaining that budget time is prospective, beginning "usually in the second or third quarter of the year"). Wolf Creek's financial services department "elected to allocate some . . . indirect groups to capital projects" due to the inherent accounting impediments if all of Wolf Creek's employees simply billed their time directly to each specific capital project. Tr. at 1388 (Robke) ("First of all, it would be very difficult for accounting . . . to track all those costs and to input all those hours at a time into our financial system."). The financial services department reevaluates the departmental splits annually. Tr. at 1390.

Wolf Creek has approximately sixty departments, Tr. at 1391 (Robke), and half split their time between capital projects and operations, Tr. at 1391. Departments that do not receive any indirect labor allocations to capital projects include, *inter alia*, health physics, 43/ chemistry, 44/ operations, and security. Tr. at 1390. None of the labor costs incurred by these departments are included in the construction overhead pool. Tr. at 1390. Departments that do split time between capital projects and operations include executive, engineering, 45/ human resources, 46/ and financial services. 47/ See Tr. at 1391; Tr. at 1288 (Holloway)

43/ "Health physics is a group that monitors our contamination throughout the site, making sure it stays where it's supposed to be and doesn't leave the area." Tr. at 1391 (Robke).

44/ The chemistry department is "in charge of all the chemical balance in all of our systems at the plant." Tr. at 1391 (Robke).

45/ The engineering department included employees assigned to rerack project teams and directly billed to the project. Tr. at 1395 (Robke). Because a portion of the engineering department's time represents "the supervision and clerical support that those groups require," it is also included in the construction overhead pool and "is not billed directly to the project." Tr. at 1395; see also Tr. at 1293, 1297-99 (Holloway) (discussing responsibilities and tasks of various engineering departments in connection with rerack project, including monitoring fuel movements and heat levels in spent fuel pool, evaluating potential accident conditions, and supervising other engineering tasks).

46/ "Human resources does all of our in-processing, which includes training and all that work for all contractors that come on site for any project. . . . [U]sually there's maybe two to three days of training, depending on the level of access that each of these contractors would need. So they . . . bill part of their time to the indirect pool for that reason." Tr. at 1394 (Robke); see also Tr. at 1282 (Holloway).

47/ The financial services department had at least four employees who were assigned to track the costs of the rerack project and billed the rerack project directly for that work. See Tr. at 1392-93 (Robke) ("Shirley Heath. . . [h]elped capture the time sheets, the e-mails, all

(discussing executive support); PX 186 at 0009 (accounting procedure to administer construction overheads).

(ii) Capitalized administrative costs

Capitalized administrative costs represent capitalized portions of lease costs for copiers, computers, and other administrative services. Tr. at 1396 (Robke). A percentage of these costs is included in the construction overhead pool for a given year because those services are used by all of Wolf Creek's employees and contractors to provide indirect support for the rerack project and other capital projects. Tr. at 1396. The percentage of the capitalized administrative costs is reviewed annually and a rate is developed. Tr. at 1396 ("[U]sually around 5 to 6 percent on an annual basis.").

(iii) Labor overheads on indirect labor

The allocated labor overheads on indirect labor represent the percentage of labor overheads that is applied to the amount of indirect labor costs in the construction pool, which yields the total available to allocate in the construction pool. Tr. at 1397 (Robke) ("[Indirect labor means,] [w]hen a certain percentage [of the amount] of a group is added to the pool of labor to allocate, whatever that percentage is, [those] labor overheads are added on top of that.").

3) Defendant's challenge to plaintiffs' overheads claim

Defendant advances three arguments against plaintiffs' recovery of its claimed overheads that are disputed. First, defendant contends that plaintiffs can only recover overhead costs that are "incremental," to DOE's breach, that is, costs that have changed as a result of plaintiffs' mitigation efforts. See Def.'s Br. filed July 16, 2010, at 28. As such, fixed costs are not recoverable. Second, defendant asserts that plaintiffs failed to correlate Wolf Creek's claimed overhead costs with its rerack mitigation efforts. See *id.* at 36. Last, defendant disputes Wolf Creek's reliance on the total-cost allocation methodology, arguing

47/ (Cont'd from page 65.)

the different records that showed Wolf Creek's time, actual hours spent that ended up resulting in our direct labor charges for that project."); PX 224. Mr. Robke's own involvement, for which he did not directly bill the rerack project, included monthly review and oversight of Ms. Heath's activities and actual project budget review. Tr. at 1393. There were also "at least a couple of estimators that did some work on the project to develop the budget" and reported to the project manager, but who did not directly bill the project. Tr. at 1394. But see Tr. at 1477-84.

that such cost accounting allocations artificially inflated the construction overhead rate by including the material costs of the rerack project. See id. at 31.

Defendant's principal argument, which it has pressed repeatedly before the Court of Federal Claims, e.g., Edison, 93 Fed. Cl. at 356; S. Nuclear Operating Co. v. United States, 77 Fed. Cl. 396, 441-42 (2007), is that plaintiffs cannot recover claimed overheads that are "fixed costs" that do not rise and fall as a consequence of the breach, see Def.'s Br. filed July 16, 2010, at 28; Tr. at 1663 (Johnson) (discussing fixed costs associated with material overheads); Tr. at 1668-69 (Johnson) (discussing fixed costs associated with construction overheads); DX 106 at slides 24, 28 (same, respectively). Without showing such a relationship, defendant charges that plaintiffs would incur a windfall. Defendant's damages expert, R. Larry Johnson, qualified in financial analysis, cost accounting, arbitration, and analysis of economic damages, testified that an allocation of fixed overhead costs to capital projects is not a proper measure of overhead damages. See Tr. at 1650-52 (Johnson). Instead, the proper measure of damages is the difference between the breach and the non-breach world, i.e., overhead costs must be incremental to the breach. See Tr. at 1650-52; Def.'s Br. filed July 16, 2010, at 29 ("[T]he proper measure of economic damages is whether Wolf Creek's total overhead costs change as a result of the breach-related activity.").

Plaintiffs counter that the law does not recognize defendant's incremental theory as a measure of damages and that plaintiffs' overheads claim reflect true costs that are attributable to their mitigation efforts and thus to DOE's breach. See Pls.' Br. filed July 16, 2010, at 26. Plaintiffs do not dispute that their claimed overheads contain some fixed costs. See Tr. at 1491, 1497-98 (Robke) (agreeing that construction overheads contain "a lot of fixed costs" that are "not really incremental costs"); Tr. at 1464 (Robke) (discussing how material overheads from 1997 through 2001 remain relatively fixed). Rather, plaintiffs argue that, absent the breach, Wolf Creek could have allocated those overhead resources to other projects. Plaintiffs cite to Mr. Holloway's testimony that, "but for the government's partial breach, the resources comprising Wolf Creek's construction and material overhead pools could have and would have been allocated to other projects." Pls.' Br. filed July 16, 2010, at 27 (citing Tr. at 1300-01). Plaintiffs also cite to the testimony of their expert in cost and managerial accounting Prof. Jerold L. Zimmerman that the "full market value of the time Wolf Creek's employees devoted to the rerack project is the sum of both Wolf Creek's direct labor billings and its overhead costs, since . . . employees devoted time to the rerack project but did not directly bill for that time." Id. (citing N. States Power Co. v. United States, 78 Fed. Cl. 449, 468 (2007) ("[E]very use of a resource has an opportunity cost—namely, the alternative uses of that resource"); TVA, 69 Fed. Cl. at 539 (explaining that test for recovering internal labor costs is "whether use of the internal resources by TVA deprived it of the ability to employ those resources on other projects"))); see Tr. at 1826-28, 1851 (Zimmerman). For the following reasons, the court agrees with plaintiffs' analysis.

Earlier spent nuclear fuel decisions issued by other judges of the Court of Federal Claims establish that recovery of overhead costs “is proper where there is some connection between the mitigation project and the utilities’ overhead.” Edison, 93 Fed. Cl. at 358 (citing TVA, 69 Fed. Cl. at 535, 542; Sys. Fuels, Inc. v. United States, 78 Fed. Cl. 769, 799 (2007), on reconsideration, 92 Fed. Cl. 101 (2010); Sacramento Mun. Util. Dist. v. United States, 70 Fed. Cl. 332, 376-77 (2006) (“SMUD”), rev’d in part on other grounds, 293 Fed. App’x. 766 (Fed. Cir. 2008); Dominion Res. Inc. v. United States, 84 Fed. Cl. 259, 280-81 (2008)); see also Wisc. Elec. Power Co. v. United States, 90 Fed. Cl. 714, 790-91 (2009) (awarding administrative and general overheads). “[O]verhead costs are recoverable as long as a utility can demonstrate that ‘overhead costs were incurred and are properly attributable to mitigation projects and activities.’” Dominion Res., 84 Fed. Cl. at 281 (citation omitted). “Overhead, by definition, is a cost of doing business, and for some period of time, part of [a utility’s] ‘business’ was mitigating DOE’s partial breach.” Carolina Power I, 82 Fed. Cl. at 48.

Numerous Court of Federal Claims decisions reject defendant’s incremental argument. See, e.g., Edison, 93 Fed. Cl. at 358; Energy Nw., 91 Fed. Cl. at 553 (finding argument regarding lack of incrementality was raised and resolved by Federal Circuit and noting that there is “no requirement that the injured plaintiff [has] to prove that its internal resources costs [has] increased as a result of the Government’s breach”); Dairyland Power Coop. v. United States, 90 Fed. Cl. 615, 637-38 (2009); Wisc. Elec. Power, 90 Fed. Cl. at 791; Carolina Power I, 82 Fed. Cl. at 48; Dominion Res., 84 Fed. Cl. at 281; Sys. Fuels, 78 Fed. Cl. at 799; cf. N. States Power, 78 Fed. Cl. at 468; S. Nuclear, 77 Fed. Cl. at 441-43; see also Tr. at 1713-14 (noting that Mr. Johnson has testified as defendant’s damages expert in Southern California Edison, Pacific Gas and Electric, Energy Northwest, Dairyland, Dominion Resources, Carolina Power, Southern Nuclear, and Yankee I cases). 48/ Defendant presents no argument in this case that causes the undersigned judge to depart from the holdings of these cases. Moreover, to the extent that the Court of Federal Claims has denied overhead recovery, it has done so because the plaintiffs failed to connect their overhead costs to mitigation efforts, not because the overheads were “fixed costs.” E.g., Ariz. Pub. Serv. Co. v. United States, 93 Fed. Cl. 384, 393-94 (2010) (“However, plaintiff did not provide sufficient details for the court to make the necessary findings; it did not make a sufficient showing of the relationship between its claimed costs and mitigation activities. Plaintiff . . . was not required to show an increase in its overhead pool in relation to

48/ But see SMUD, 70 Fed. Cl. at 376-77 (rejecting overhead and internal labor claims when plaintiff failed to show costs were incremental to DOE’s breach). While the Court of Federal Claims in SMUD credited defendant’s incremental-costs argument in disallowing overhead costs, it did so in the absence of any supporting legal analysis, and it stands apart from the overall spent fuel case law in the Court of Federal Claims. Any support that SMUD provided for defendant’s incremental argument was abrogated by the Federal Circuit’s approval of an award of fixed overhead in Carolina Power II, 573 F.3d at 1276-77.

mitigation activity. It had to show only how such costs relate to mitigation activity, to a reasonable certainty.”); TVA, 69 Fed. Cl. at 542 (rejecting capital support overhead expenses consisting of management allocations where plaintiff failed to establish relationship between overhead and mitigation efforts (dry fuel storage)).

Defendant cites the Federal Circuit’s opinions in Yankee II, 536 F.3d at 1273, and Bluebonnet V, 339 F.3d at 1346, as supporting the “conclusion that overhead costs should be awarded only if they represent a change in plaintiffs’ net financial condition resulting from the breach.” Def.’s Br. filed Aug. 9, 2010, at 29. Neither case provides such support. Both Yankee II and Bluebonnet V establish the need to conduct a “but-for” analysis in order to establish direct damages; this does not translate into a requirement that plaintiffs must conduct a “but-for” analysis to be entitled to indirect damages, such as overhead costs. Indeed, the Federal Circuit recently put the final nail in this argument’s coffin when it affirmed an award of fixed overhead and indirect costs not incremental to DOE’s breach as “properly allocated.” See Carolina Power II, 573 F.3d at 1276-77.

Defendant cites another Federal Circuit opinion, Precision Pine & Timber v. United States, 596 F.3d 817, 834 (Fed. Cir. 2010), to support the proposition that “[r]ecovery for overheads is only appropriate where a plaintiff makes a showing that the size of the overhead pool at issue bears some demonstrable relationship to the existence of a project for which that plaintiff seeks to recover damages.” Def.’s Br. filed July 16, 2010, at 30. Defendant’s reliance on Precision Pine is misplaced. The Federal Circuit in Precision Pine upheld the trial court’s denial of claims for certain manufacturing costs allegedly stemming from the Government’s suspension of timber harvesting contracts. Precision Pine, 596 F.3d at 832 (“Precision Pine presented evidence that the Forest Service’s breach caused it to suffer losses due to the lower volume and quality of logs its mills processed.”). The court concluded that the claimed manufacturing costs were the “fixed costs of operating Precision Pine’s sawmills—namely, the cost of labor, taxes, and insurance.” Id. at 834. Because those costs were “associated with milling timber from other, collateral contracts not at issue in [that] suit,” id. at 832, the costs were not in any way related to the breach, id. at 834. Here, by contrast, the claimed overhead costs are not attributable to any collateral contracts. Even though they are a form of indirect damages, they are directly related to the Standard Contract in that they are a consequence of Wolf Creek’s mitigation efforts. While the court in Precision Pine observed that there was no “change to the underlying cost of operating the sawmills; [the plaintiff] would have had to bear the costs of its sawmill operations regardless of whether the Forest Service breached the contracts,” id., it is not apparent that the Federal Circuit intended this statement to apply broadly to overhead damage claims.

Last, defendant cites to the trial court’s opinion in Pacific Gas I, 73 Fed. Cl. at 406-08, in which the plaintiff utility voluntarily deducted certain costs that were not caused by the Government’s breach. Defendant characterizes the deducted costs as being “certain

insurance costs and ‘certain company support costs’ that were not incremental to the breach,” and charges that plaintiffs in the case at bar made no attempt to identify and deduct costs that were not incremental to their claim. Def.’s Br. filed July 16, 2010, at 30. Defendant mischaracterizes these costs, which were identified in Pacific Gas I by the plaintiff’s expert as costs that were “costs billed to third parties” originally not included in the plaintiff’s cost schedule, but added to its cost schedules, and hence to its damages claim, “so that the activity prices accurately reflect the additional cost of third-party billing.” See Pac. Gas I, 73 Fed. Cl. at 406-07. The costs deducted from the plaintiff’s claim were costs that the plaintiff forthrightly determined were unrelated to DOE’s breach. In contrast, plaintiffs claim that their overheads are attributable to Wolf Creek’s mitigation efforts and therefore are related to DOE’s breach. Pacific Gas I is irrelevant to defendant’s incremental argument.

By raising the same tired argument about fixed overheads in case after case, defendant attempts to circumvent settled law concerning overhead damages. See Edison, 93 Fed. Cl. at 358 (“The defendant thus rejects the fundamental nature of overhead damages.”). By their very nature, overhead damages incorporate certain fixed costs “representing requirements of running the company,” many of which “are typical expenditures of the utility’s normal operations.” Id. “Overhead, by definition, is a cost of doing business, and for some period of time, part of [Wolf Creek’s] ‘business’ was mitigating DOE’s partial breach.” Carolina Power I, 82 Fed. Cl. at 48 (“Overhead recovery is necessary to compensate Plaintiffs fully.”).

Moreover, Federal Circuit precedent supports plaintiffs’ argument that DOE’s breach prevented Wolf Creek from reallocating the resources spent on mitigation efforts to other projects. In Carolina Power II, the Federal Circuit held that, “if [the utility] had not applied stores overhead to the breach-related projects at issue in [that] case, other activities would have assumed a disproportionate amount of the total overhead costs.” 573 F.3d at 1277 (affirming award of fixed overhead costs); see also Edison, 93 Fed. Cl. at 359 (“If a proportional amount of the utility’s general overhead is not allocated to the [mitigation efforts], other projects and . . . operations will support an unequal share of the overhead costs.”). The court credits the testimony of Mr. Holloway that Wolf Creek diverted its resources to the rerack project from other projects and normal operations. Tr. at 1300-01. Therefore, the court finds “no basis in law or logic for [d]efendant’s position.” Carolina Power I, 82 Fed. Cl. at 48.

Defendant also argues that plaintiffs have not established a correlation between Wolf Creek’s claimed overheads and its resources incurred to support the rerack. See generally, Def.’s Br. filed July 16, 2010, at 36-43. Defendant characterizes the testimony of plaintiffs’ witnesses supporting their presentation of overhead activities relating to the rerack as mere conclusory statements. Based on the evidence of mitigation-related activities described above, this argument is without merit. See Tr. at 1390-95, 1954-60 (Robke) (discussing departments that contributed to rerack project but that did not directly bill time spent on

project); Tr. at 1287-99 (Holloway) (describing departments that contributed to rerack project including those that billed to rerack project directly and those that did not). The court credits Mr. Robke's explanation that a portion of the time spent on the rerack project by these employees was allocated properly to the construction overhead account, as the employees do not directly charge to overhead themselves. Tr. at 1398. "Wolf Creek's construction overhead allocation is designed to account for these workers who contribute to a capital project, but do not directly charge their time to that project." Pls.' Br. filed Aug. 9, 2010, at 19. The court also credits the testimony of Wolf Creek's former President and CEO, Mr. Muench, who described the project as "a very sensitive project. Its nuclear fuel. . . . [T]he most important thing we do is handling nuclear fuel related activities." Tr. at 939. These important activities would not proceed without careful planning and oversight of Wolf Creek's executives, which Mr. Muench explained is precisely what transpired. See Tr. at 939-40.

The court finds and holds that construction overhead costs were incurred by Wolf Creek and are attributable to plaintiffs' mitigation efforts. The court agrees with plaintiffs that "Wolf Creek presented the court with a significant amount of evidence about the numerous departments that provided vital indirect labor for the rerack project and had a portion of their time allocated to the construction overhead pool." Pls.' Br. filed Aug. 9, 2010, at 25. The court also finds and holds that material overhead costs similarly were incurred by Wolf Creek and are equally attributable to plaintiffs' mitigation efforts. Plaintiffs have satisfied their burden of showing that "overhead costs were incurred and are properly attributable to mitigation projects and activities." Dominion Res., 84 Fed. Cl. at 281 (internal quotation marks omitted) (citation omitted).

Defendant next challenges plaintiffs' total-cost allocation methodology, arguing that, because it included high materials and contractor costs, the methodology "acted as a magnet for indirect costs, resulting in a disproportionately large allocation of construction overheads (\$3.45 million) to the rerack project, based simply upon the total cost of the project – not the amount of internal resources the project may have used." Def.'s Br. filed July 16, 2010, at 31. Holtec was paid approximately \$8.7 million, which represents roughly eighty-eight percent of the total direct cost of the project. See id.; DX 106 at slide 48; PX 250; Factual Stipulations ¶ 21; Tr. at 1686 (Johnson); Tr. at 1016 (Muench). Defendant observes that, of the total \$8.7 million paid to Holtec, nearly \$6 million consisted of the material costs of the racks. See PX 250; Tr. at 1968 (Robke). According to Mr. Johnson, use of these material costs in the construction overhead calculation "is disproportionate because it does not capture the cause and effect relationship between the overhead costs and what caused those

overheads to be incurred.” Def.’s Br. filed July 16, 2010, at 31 (citing Tr. at 1686-88 (Johnson)); see also Tr. at 1887 (Zimmerman). 49/

Mr. Johnson testified that the total-cost method is not widely used in the cost accounting community. Tr. at 1705-06 (citing, *inter alia*, Professor Zimmerman’s cost accounting textbook analysis of a survey of allocation methodologies using 293 respondents in which total-cost method does not appear). If an entity does use the total-cost method, it must remove outside contractor and material costs from the allocation base to prevent disproportionate allocations. Tr. at 1706-09 (discussing DX 106 at slides 52-56). Mr. Johnson analogized how the total-cost method creates disproportionate overheads to the use of “gold wire” rather than steel in constructing a wheel. If five different projects each had \$100.00 in labor overhead, a total of \$500.00 in direct labor would be allowed, and each project would receive a twenty percent (or \$20.00) allocation of overhead based on the labor. Mr. Johnson then added the material costs of steel wire to four of the five projects costing \$10.00 each, but the fifth project used gold wire costing \$1,000.00. Because the amount of labor expended remains constant, the fifth project does not consume more overhead resources. However, under the total-cost allocation, four of the projects would receive a \$7.00 overhead allocation rather than \$20.00, and the gold wire project would receive \$72.00. Tr. at 1689-90 (Johnson). 50/

Consequently, defendant contends that material costs should be excluded from any recovery of construction overheads. Def.’s Br. filed July 16, 2010, at 35. Defendant calculates that these material costs—\$6,047,174.74—amount to approximately sixty percent

49/ Defendant erroneously asserts that the “only internal resources that could possibly have been related to the over \$6 million in material costs would have been captured by the \$260,725.47 in material overheads allocated to the rerack.” Def.’s Br. filed July 16, 2010, at 35 (citing Tr. at 1401 (Robke)). However, that material overhead is specific to Wolf Creek’s warehouse operations, including the inspection of materials delivered to the plant. See Tr. at 1401 (Robke). This is a separate cost item, distinct from Wolf Creek’s labor and construction overheads and does not account for all of those costs. Therefore, plaintiffs would not be “fully compensated through recovery of \$260,725.47 in material overheads.” Def.’s Br. filed July 16, 2010, at 35.

50/ Mr. Johnson asserts that the more accurate and reasonable allocation methodology is the direct labor method, whereby overheads are allocated based on the project’s direct labor costs. See Tr. at 1688, 94. Under this method the construction overheads reduce to \$100,000.00. Tr. at 1699-1700 (Johnson). Yet, Mr. Johnson would deny recovery for even this amount because it is “of a nonincremental nature.” Tr. at 1737. The court declines to adopt a direct-labor methodology. See Tr. at 1966-67 (Robke) (explaining that direct-labor method would likely cause rates to increase).

of the \$10 million claimed total rerack project cost (including the total direct charges, plus labor overheads and the Morris and Ferguson labor). See id. (“[Sixty percent] of the construction overheads allocated to the rerack project relate to materials costs.”); PX 250. Should the court not accept its incrementality argument, defendant seeks a sixty-percent reduction in any construction overhead award, or a reduction of \$2.1 million, leaving a remaining \$1.35 million for construction overheads. Def.’s Br. filed July 16, 2010, at 35.

Plaintiffs argue that the total-cost method is reasonable and fairly apportions Wolf Creek’s construction overhead costs. See Tr. at 1860-62 (Zimmerman) (characterizing total-cost allocation method as reasonable). Wolf Creek’s accounting method is in line with industry standards, and Wolf Creek’s financial services department “carefully monitors and analyzes the plant’s construction overhead pool and rate in order to produce the most accurate allocation of construction overhead costs as possible.” Pls.’ Br. filed July 16, 2010, at 30. Plaintiffs submit that the overhead percentage allocated to the rerack project is in line with other industries, as well. See PX 248 (showing overhead rates in computer industry at 440 percent based on allocation base of direct manufacturing labor hours). But see Tr. at 1774-76 (Johnson) (disputing that PX 248 accurately reflects a direct-labor allocation method). Plaintiffs argue that defendant offered no evidence to substantiate its contention that Wolf Creek’s construction overheads were unusually high. See Pls.’ Br. filed July 16, 2010, at 29.

In addition, plaintiffs note that Mr. Johnson did not challenge the validity or accuracy of the amount of the construction overhead pool, which totaled over \$10 million in aggregate costs from the relevant time period of 1997 through 2001. See PX 234. Plaintiffs would minimize the weight given to Mr. Johnson’s testimony on the grounds that he displayed “no knowledge about how a nuclear plant operates and could not speak to how much in construction overheads should have been ‘properly’ allocated for each department.” Pls.’ Br. filed July 16, 2010, at 31 (citing Tr. at 1735-46 (Johnson)).

Finally, plaintiffs dispute defendant’s position that the construction overhead claim should be reduced by a percentage corresponding to the amount of direct-material overhead charges. First, plaintiffs explain that the material overheads claim is distinct from its labor and construction overheads claims and that material overheads pertain to Wolf Creek’s warehousing costs, not the cost of materials for the rerack project. See Pls.’ Br. filed Aug. 9, 2010, at 23.

Before proceeding to analyze defendant’s argument against plaintiffs’ construction overhead rate, the court considers its impact on plaintiffs’ material overheads claim. The court finds and holds that because Wolf Creek’s material overhead costs were capped annually at \$250,000.00, see Tr. at 1406 (Robke), any inflationary defects that could be found in the total-cost allocation methodology’s application to the construction overhead rate

would not carry over to the material overhead rate. Therefore, having already found that Wolf Creek incurred material overhead costs attributable to plaintiffs' mitigation efforts, the court awards plaintiffs \$260,725.47 in damages for material overheads.

Defendant did not challenge the overhead allocation methodology in cases in which the court has awarded overhead costs to SNF plaintiffs. See, e.g., Energy Nw., 91 Fed. Cl. 531; Dairyland, 90 Fed. Cl. 615; Wisc. Elec. Power, 90 Fed. Cl. 714; Dominion Res., 84 Fed. Cl. 259; Carolina Power I, 82 Fed. Cl. 23. By contrast, in the case *sub judice*, defendant does challenge Wolf Creek's use of the total-cost overhead allocation methodology. See Def.'s Br. filed Aug. 9, 2010, at 36. As such the overhead allocation methodology is before the court as an issue of first impression.

The court finds merit in defendant's objections to the total-cost method. Plaintiffs' damages expert Prof. Zimmerman characterized Wolf Creek's use of this method as a practical and reasonable way for businesses to estimate economic costs. Tr. at 1851. He sought to buttress this claim by testifying that the total-cost methodology is widely used and noted that Wolf Creek had used this methodology "since 1987," he assumes, for "valid business purposes." Tr. at 1860; see also Tr. at 1896 (Zimmerman) (explaining that, because Wolf Creek used its total cost allocation methodology "for a long time, it is likely meeting . . . some legitimate business purpose"). While Prof. Zimmerman offered this and other reasonable-sounding testimony, defendant successfully exploited the infirm bases for his opinions about Wolf Creek. For example, Prof. Zimmerman never asked for or was given Wolf Creek's raw financial data, nor did he talk with Wolf Creek's accounting personnel. See Tr. at 1882-83. Plaintiffs never asked Prof. Zimmerman to review whether Wolf Creek's \$3.7 million in claimed construction and material overheads derived from the correct measure of damages. Tr. at 1865. In fact, Prof. Zimmerman admitted that he was not "charge[d]" with "opining on the numbers"; he was hired to counter Mr. Johnson's analysis. Tr. at 1883 ("Well, I didn't have to [review Wolf Creek's raw financial data] to assess the logical flaws in Mr. Johnson's report. Since I wasn't opining on the numbers, one can look at the logical analysis and say whether the logic is correct without actually looking and testing the numbers."). 51/

51/ The court does not suggest that, by contrast, Mr. Johnson's testimony is without criticism. In addition to towing defendant's roundly rejected incremental-overhead theory, cross-examination revealed that Mr. Johnson had no idea what Wolf Creek's various departments that contributed to the rerack project actually did. See Tr. at 1741-44 (Johnson). He displayed an inadequate working knowledge of Wolf Creek's accounting system, as revealed by his statement that any employee working on the rerack project would have directly billed for that project. Tr. at 1745-46 (Johnson); Pls.' Br. filed July 16, 2010, at 32. Although Mr. Johnson remained attached to the idea that any work performed on the rerack always was billed directly, the uncontradicted testimony of Wolf Creek employees shows

The court has no quarrel with Prof. Zimmerman's characterization of Wolf Creek's use of the total-cost method as a reasonable form of cost accounting for business purposes. The fact that Wolf Creek has used this method since 1987 confirms this point. However, what makes for good business accounting does not translate automatically into a fair and reasonable apportionment of damages.

It cannot be denied that plaintiffs have established that Wolf Creek incurred overhead costs in its mitigation efforts. See Ariz. Pub. Serv., 93 Fed. Cl. at 393 (explaining that, to recover overhead costs, spent fuel plaintiffs "must provide evidence of a relationship between its overhead and its efforts to mitigate damages caused by the breach"). However, the allocation method used to calculate these overhead amounts must bear some relationship to the resources actually expended. In cross-examining Mr. Robke, defendant established that the construction material costs—that is, the cost of the racks—bore no relationship to Wolf Creek's resources expended on the rerack project. The following exchange between defense counsel and Mr. Robke illustrates this disconnect:

Q. (Defense counsel) . . . [Do] you recall that the material received from . . . Holtec for the rerack project was \$6 million? Do you recall that?

A. (Mr. Robke) Approximately, yeah.

Q. Now assume for some reason, say steel prices go up, any other reason, that the same material cost[s] \$12 million instead of \$6 million. Do you understand that?

A. Yes.

Q. Same work done by Holtec, same oversight, same oversight done by Wolf Creek, same work done by engineering supervision, same work done by

51/ (Cont'd from page 74.)

Mr. Johnson to be incorrect. See Tr. at 1387-89 (Robke); Tr. at 1287-1300 (Holloway); Tr. at 939-41 (Muench). Moreover, Mr. Johnson compiled a list detailing the amount of Wolf Creek's direct labor expended on the rerack project that included employee names and job titles, see PX 224, yet he failed to notice that the list did not contain any supervisory engineers or executives other than Mr. Holloway, Tr. at 1749. Given that Wolf Creek had executives, supervisory engineers, and other managers who supervised aspects of the rerack project, the reasonable inference is that those employees were doing so without billing their time to the rerack project accounts directly. See Tr. at 939-41 (Muench).

corporate services, everything, everything is the same. Do you understand that?

A. Yes.

Q. Now, if the material were [sic] \$12 million, the amount that you would allocate as construction overhead on that material part would be twice the amount that you allocated in this case, right?

A. For that material part, yes.

Tr. at 1968-69. The total-cost allocation methodology uses both the total amounts of labor and materials as its allocation base. See Tr. at 1855 (Zimmerman). However, the exchange with Mr. Robke shows that, if the racks did—hypothetically—cost \$12 million rather than \$6 million, the total-cost allocation methodology doubles the overhead allocated for those materials without any actual change in internal resources. Def.’s Br. filed July 16, 2010, at 33; see also Tr. at 1016 (Muench) (explaining that, had Westinghouse performed rerack project, more overhead would have been allocated because Westinghouse bid at a higher price, while Wolf Creek’s overhead likely would remain unchanged); PX 139 at 7348. The material cost of the rerack project clearly was not the driver of the construction overheads, and it did not affect the internal support provided to the project. See Tr. at 1686-87 (Johnson) (“Did [Wolf Creek’s] accounting department incur more costs because [they] bought \$6 million in casks? Did [Wolf Creek’s] human resources department incur more costs because [they] bought \$6 million in casks? And the answer I think to those things has to be no.”). Plaintiffs failed to rebut this argument.

The court finds and concludes that the total-cost method’s inclusion of the cost of construction materials in its allocation base unreasonably inflates the amount of construction overheads. The court finds and concludes that plaintiffs have not proven to a reasonable certainty that the inclusion of material costs in the construction overhead rate is properly attributable to Wolf Creek’s mitigation efforts. However, the court also finds and concludes that plaintiffs have satisfied their burden as to the other cost items allocated to the construction overhead rate. Therefore, a modification of the amount of construction overheads sought is proper. Precedent from the Federal Circuit establishes the court’s authority to make such a modification:

As the fact finder in the bench trial, the judge is responsible for deciding what evidence to credit or reject and what result to reach. Just as a jury may find for a party without believing everything that party’s witnesses says, a judge may award damages, even if he does not fully credit that party’s methodology.

Precision Pine, 596 F.3d at 833 (upholding award of damages based on trial judge's "timber harvesting schedule of its own design, rather than the schedules offered by either party").

The court accepts defendant's suggestion that the construction overhead award be reduced by the approximate percentage amount of material charges relating to the rerack project compared with the total cost of the project. Excluding construction overheads, the total amount of costs awarded is \$10,064,080.76 (including \$9,642,887.30 in direct costs, \$160,467.99 in labor overheads, and \$260,725.47 in material overheads). The amount of material charges awarded is \$6,047,174.74, which is approximately sixty percent of this total. See PX 250. Accordingly, the court reduces the construction overhead claimed, \$3,420,935.18, see id., by sixty percent or \$2,052,561.11, and awards plaintiffs \$1,368,374.07 in construction overheads. Direct and overhead costs therefore total \$11,432,454.83.

3. Recovery for Allowance for Funds Used During Construction

Plaintiffs claim \$ 466,977.00 in damages for Allowance for Funds Used During Construction ("AFUDC" costs). 28 U.S.C. § 2516(a) (2006), allows the recovery of interest on a claim against the United States only under a statute or contract expressly providing for its payment. As foreshadowed by the litany of decisions denying recovery to SNF plaintiffs for AFUDC costs discussed in the speaking order *in limine* concerning AFUDC costs, see Order at 3-9, Kansas City Gas & Electric Co., et al. v. United States, No. 04-99C (Fed. Cl. May 28, 2010), ECF No. 114, plaintiffs had to prove that AFUDC costs are recoverable as overhead that arises from the utilities' rate regulation. See England v. Contel Advanced Sys., Inc v. United States, 384 F.3d 1372, 1379 (Fed. Cir. 2004) ("The [no-interest] rule has been held not only to bar the recovery of interest on substantive claims against the government, but also interest costs incurred on money borrowed as a result of the government's breach or delay in payment." (citations omitted)).

Plaintiffs offered two employees of plaintiffs KGE and KCPL, which are the affected plaintiffs. David L. Schneweis, Director of State and Local Tax for Westar Energy, Inc. (KGE is a subsidiary), Tr. at 1340-42, reviewed KGE's AFUDC calculations from 1992 to present. He described AFUDC costs as "opportunity costs of borrowed and other funds used to finance construction projects." Tr. at 1344. While capitalized as overhead, as allowed by FERC and accepted as such by the Internal Revenue Service on audit, Tr. at 1345-46, he agreed on cross-examination that AFUDC is a form of interest on capital projects and an interest cost, Tr. at 1356. Lori Wright, C.P.A., Vice President and Controller of KCPL, testified as to how KCPL calculated AFUDC from 1997 to 2000. Tr. at 1522, 1524-25. Her characterization of AFUDC as allowable overhead was consistent with that of Mr. Schneweis, although she described the AFUDC debt component as a "cash interest expense that's been consumed in the construction program." Tr. at 1533. She, too, agreed that

AFUDC is a form of interest expense. Tr. at 1536. Based on the case law cited in the court's May 28, 2010 speaking order, plaintiffs have failed to establish either a factual or legal predicate for recovery AFUDC costs.

4. Offset for benefits to Wolf Creek from rerack project

Defendant's response to the court's question as to the amount of deductions was to urge that defendant had proven that plaintiffs received net benefits that must be offset against plaintiffs' award for costs incurred. While this does not substitute for the amount that could survive the crucible of customary proof of damages in a breach case, it would be offensive to give plaintiffs the benefit of their rough estimates to avoid greater deductions from their mitigation costs and to deny an offset to the Government because defendant relied on the rough estimates of plaintiffs' witnesses. See Westfed Holdings, 407 F.3d at 1370 ("If the government wanted an offset, it was the government's burden to prove with reasonable certainty the quantum of benefit retained by [the non-breaching party] despite the government's breach."). Mr. Morris attested that the new racks allowed Wolf Creek to use higher-enrichment fuel and thereby purchase fewer fuel assemblies. See Tr. at 217-19. This was a real-world savings. Mr. Muench estimated that the net effect of going to that higher enrichment fuel was "hundreds of thousands of dollars per cycle." See Tr. at 966, 968. At four to five cycles, Tr. at 966, 969 (Muench), the net effect was a minimum of \$800,000.00. Defendant argues that this figure is the product of "the most conservative estimate" of plaintiffs' savings per cycle. Def.'s Br. filed Aug. 9, 2010 at 19. Plaintiffs' award will be offset in the amount of \$800,000.00. Therefore, the total award to plaintiffs reduces from \$11,432,454.83 to \$10,632,454.83.

CONCLUSION

Accordingly, the Clerk of the Court shall enter judgment for plaintiffs in the amount of \$10,632,454.83, as follows: both plaintiffs Kansas Gas & Electric Company and Kansas City Power & Light Company have a forty-seven-percent interest in Wolf Creek based on ownership and each is awarded \$4,997,253.77 in damages; plaintiff Kansas Electric Power Cooperative, Inc., with a six-percent ownership interest in Wolf Creek, is awarded \$637,947.29 in damages.

IT IS SO ORDERED.

/s/ Christine O.C. Miller

Christine Odell Cook Miller
Judge